Training Manual for Cscape and OCS/RCS

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PREFACE

This manual provides introductory level training for Cscape Software users.

For user manual updates, contact Technical Support:

North America:

(317) 916-4274

www.heapg.com

Europe:

(+) 353-21-4321-266

www.horner-apg.com

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To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.

ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing Cscape Software to appropriately design the end system, to appropriately integrate the Cscape and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

TABLE OF CONTENTS

Introduction to Cscape

Quick Start Guide

Intro to Cscape: Quick Start Guide

Objective:

The objective of this Quick-Start Guide is to familiarize yourself with some of the features and functionality of the Cscape programming software.

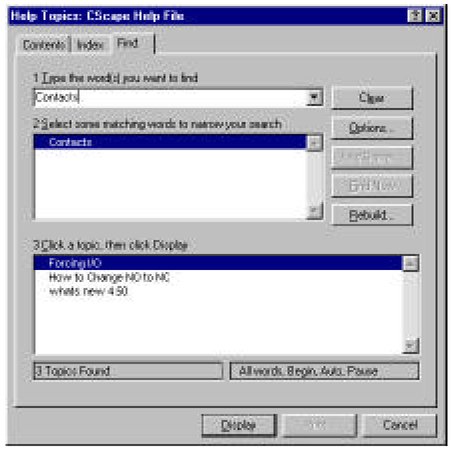
Equipment Needed:

A PC with Cscape loaded.

1.0 Help File
- 1.1 Open the help file. The help file is located under **Help** from the main tool bar.
- 1.2 Select **Contents** to access the help file.
- 1.3 The first screen has a lot of useful information that is listed below.
  - 1.3.1 What's New in Version X.XX – This section will include all of the additions that were added to that particular release of Cscape.
  - 1.3.2 Cscape Reference Manual – This section allows the user to navigate to all of the information in the help file.
  - 1.3.3 The User Interface – This describes some of the user features of Cscape and how to navigate through the software.
  - 1.3.4 Creating and Editing Ladder Programs – This section does a multitude of things from the different ladder elements to clearing out an old program.
  - 1.3.5 Creating and Editing Text Screens – This discusses how to create and manipulate the HMI portion of an OCS program.
  - 1.3.6 Networking and Communication – This section discusses the different aspects of the CsCan network and serial communications.
  - 1.3.7 I/O and CPU Configuration – This section covers how to configure a controller and a quick reference to a few of the I/O cards like the High Speed Counter, Stepper Module, and more.
  - 1.3.8 Debugging – This section covers the aspects of running the debug option in the software.
  - 1.3.9 Inside the Controller – This section covers the system resources of the controller, updating the firmware, cabling, and other features
  - 1.3.10 Project Management – This covers how to build a CsCan project for more than 1 node system.
  - 1.3.11 How Do I? – This is a quick start guide on how to get started on certain task.
  - 1.3.12 Additional Technical Support – This covers information on how to contact Horner APG.

1.4 Searches can be done through selecting **Find** from the top of the screen.

1.4.1 Upon opening the Find portion of the help file, type in "Contacts" and the following will be shown on the screen.



1.5 The programmer also has the ability to open the help file by pressing F1 on the keyboard of the PC.

2.0 Getting Started

2.1 There are 2 ways to create a new program. A new program will have a name of "Untitled" until the program is saved as its file name.

2.1.1 Create a program under the **File** selection on the main menu

2.1.2 Create a new program by pressing the New File from the Tool Bar at the top of the screen.

2.2 There are 2 ways to save a program. All programs will be saved as the "filename".csp

2.2.1 Save a program under the **File** selection on the main menu

2.2.2 Save a program from the shortcut on the Tool Bar at the top of the screen.

2.3 There are 3 ways to open a program.

2.3.1 Open the program under the **File** selection on the main menu.

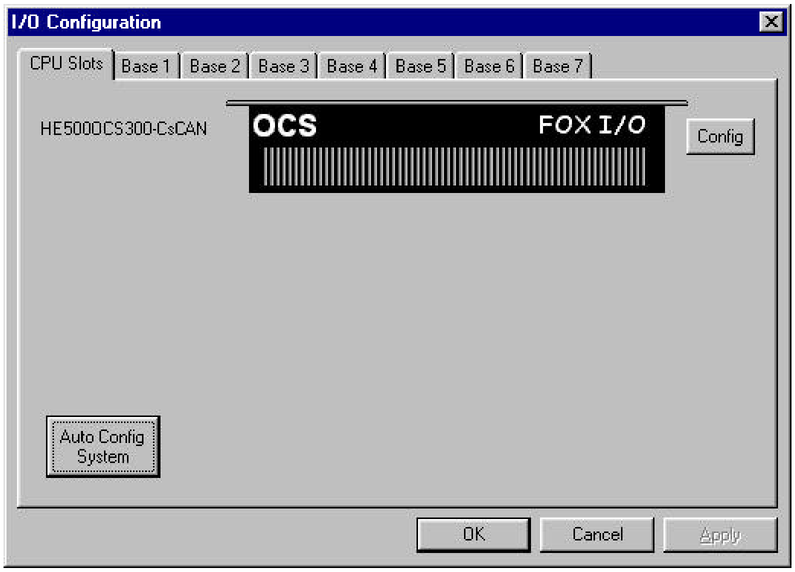
2.3.2 Open a program from the shortcut on the Tool Bar at the top of the screen.

2.3.3 The program will automatically open if the program is double clicked on in the location where it is stored on your PC.

2.4 Configuring a controller is done be clicking the **Controller** menu and selecting **I/O Configuration**. This will bring up the screen below. If no controller is attached to the PC, the controller will default to the OCS300. If there is a controller attached to the PC and the target ID matches the local ID; the controller will match what the PC is attached to. There are 2 ways to configure the controller.

2.4.1 Manually configure the controller by pressing the Config button next to the controller and then select the controller from the pull down list.

2.4.2 Configure the controller from the Auto-Configure option. Keep in mind on existing programs that Auto-Configure will erase I/O configurations that deviate from the default parameters. An example of this would be in an application with a High Speed



Counter that uses an option other than option 1 or any analog modules that have the ability to change the input or the output type.

2.5 Configuring the I/O is done from the same place as configuring a controller. I/O is never automatically configured without the user telling it to happen, unlike the controller that will automatically configure if the PC is connected to it when Cscape is opened.

2.5.1 If the Auto-Configuration option is used, the I/O will be recognized when you Auto-Config. On OCS units utilizing the FOX I/O system, the I/O will appear on the base where the I/O is connected. On the OCS250 and below, the I/O will appear on the stack with the controller. The one exception is for Ethernet cards, which will always be connected directly to the controller, regardless of controller type.

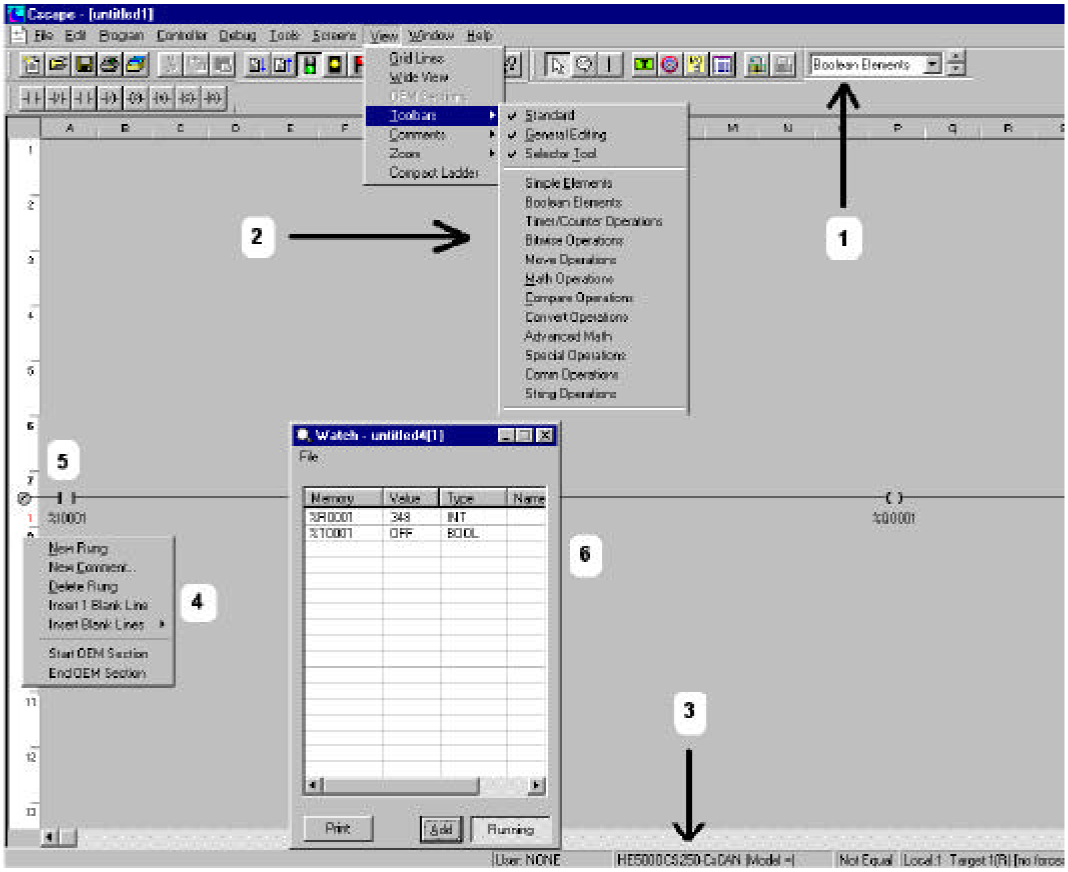
2.5.2 If the I/O is manually configured, go to the position that the module is to be configured and click on the Config button or double click on the position. The screen shown below will appear. Select the appropriate module for the slot. For FOX I/O systems, select the tab corresponding to the FOX base address.

2.6 Toolbars are used to place Ladder elements and functions.

2.6.1 Selector Tool – This allows the programmer to select between the different tool bars with 1 shown on the screen at a time. This is achieved through the pull down menu at the top of the screen. **#1** in the picture below illustrates the location of the pull down selection.

2.6.2 Menu Toolbar Selection – The user can setup Cscape to display multiple Toolbars at a time. This is done through selecting multiple Toolbars under **View** and **Toolbars**. **#2** in the picture below illustrates this. The toolbars can be left floating over the main

Cscape program or can be dragged and “docked” to the top or left side of the screen.



2.7 The status bar has many useful features. **#3** points to the status bar.

2.7.1 **User** – The User field indicates which user is currently logged into the program via use of the Security features. If security is not configured or if no one is currently logged in, this will indicate NONE as it does in the illustration.

2.7.2 **Model** – This will let the programmer know which unit the program is configured for and whether the configured model is equal to the model that the PC is connected to.

2.7.3 **Program Equality** – This is the box to the right of the Model box. This will let the user know if the program in the unit and the program in Cscape are equal. If the status indicates Unknown, the user might need to perform a verify between the controller and the software.

2.7.4 **Local and Target** – The Local ID indicates the node ID of the controller that the PC is directly connected to while the Target ID indicates the node ID of the controller that Cscape is trying to talk to. The Target ID does not need to match the local id. If programming is to be performed across the CsCAN Bus, then the Target will be the node that will receive the download. The (R) indicates that the controller is in RUN mode, (I) indicates that the controller is in STOP or IDLE mode, and (D) indicates that the controller is in DO/IO state. If a (B) is shown, it means the

controller is Busy because another computer is trying to talk to it at that moment.

2.8 Starting a New Rung of logic can be done in either of two different ways.

2.8.1 **Placing a contact** – A new rung can be started by dropping a contact on to the screen. The user needs to drop the contact in A column for this to occur. To verify that a new rung has been started, look at the left margin. If there is a screw head in the margin, a new rung has been started. See **#5** in the picture on the previous page. Another thing to consider when programming a parallel contact is that placing the parallel contact in the A column will start a new rung. To get around this, place the branches first.

2.8.2 **Right clicking in the margin** – right clicking in the left-hand margin and selecting **New Rung** can also create a new rung. See **#4** in the picture on the previous page.

2.9 Data Watch enables the user to monitor and/or change values in a table. **#6** is what Data Watch looks like. Data Watch is selected from the magnifying glass on the Toolbar or through selecting it from the **Controller** menu. New fields are added to Data Watch by clicking Add and then keying in the register and the type. Ranges of addresses can be added at one time by using the notation ‘r15-25’, which will add 11 registers from %R15 through %R25.

Notes:

LAB 1

Basic OCS Programming and Configuration

Lab 1: Basic OCS Programming and Configuration

Objective:

The objective of this lab is to give you the knowledge to use Cscape to create a program including hardware configuration, logic design, and screen development.

This foundation will then be used to help you expand your skills in the use of Cscape and the OCS.

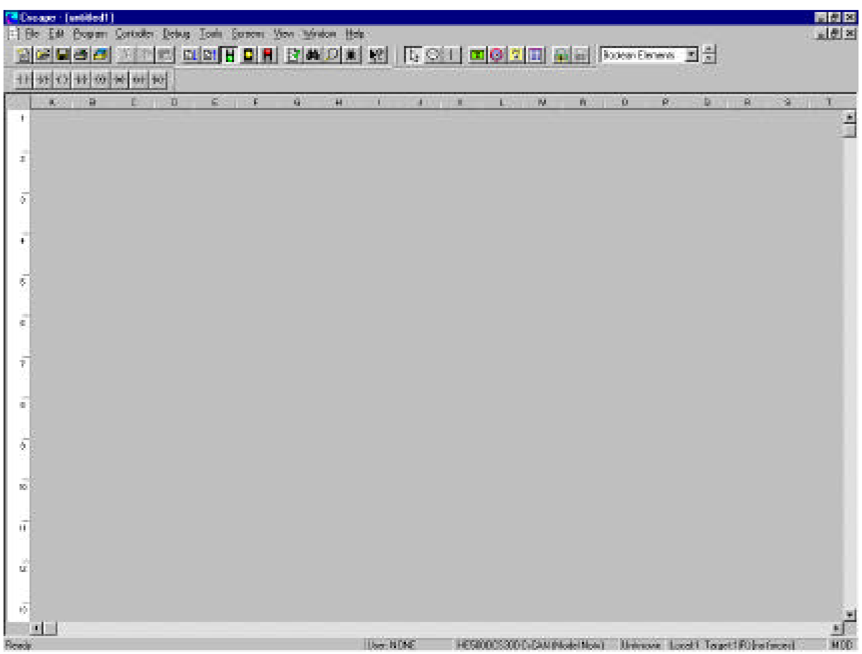
Procedure:

Step 1

- **Connect the OCS100 Demo Case to your PC.** Connect the serial cable provided to the OCS 9 pin programming port and the 9 pin serial port on your PC.

Step 2

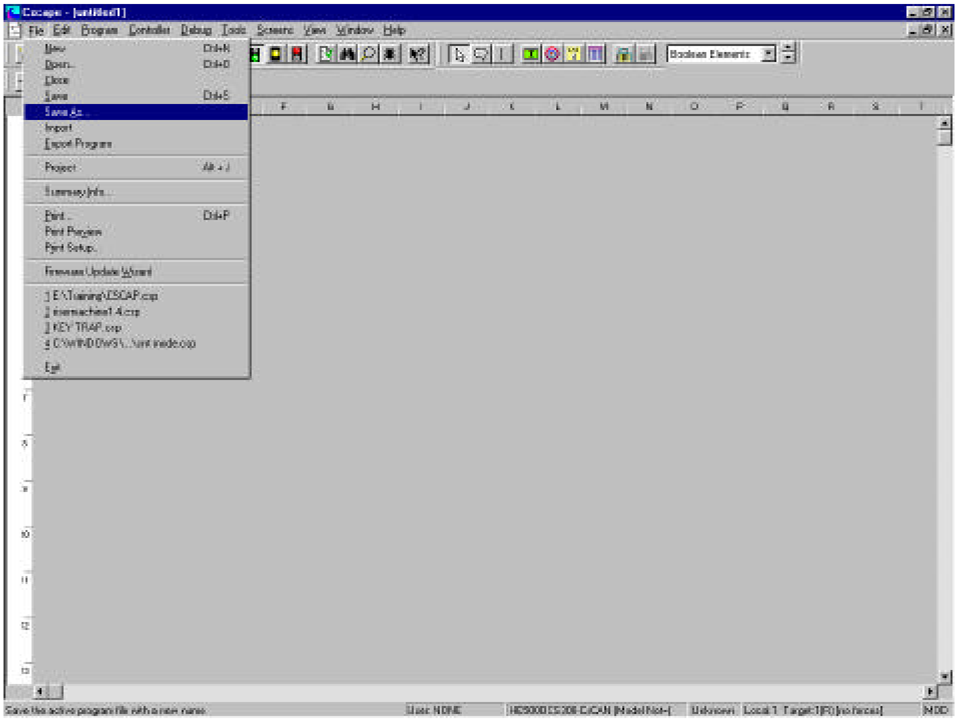
- **Power up the OCS and start Cscape on your PC.** Connect the power supply to the OCS. Open the Cscape program on your PC. A new, blank program called "untitled1" is automatically opened and should be automatically configured for your OCS if the serial cable is properly connected.



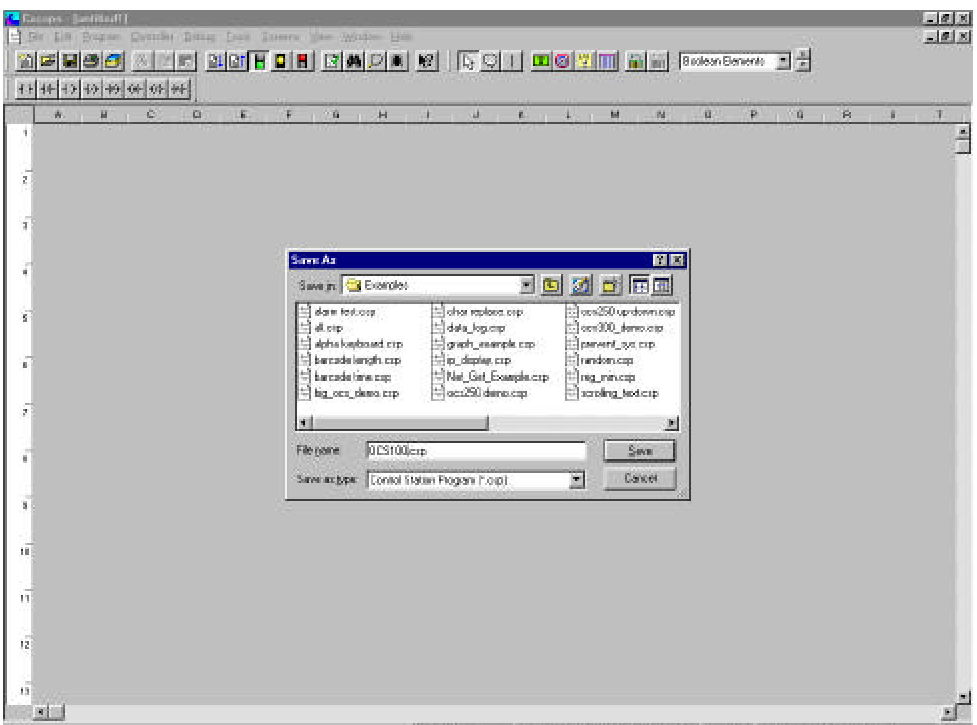
Step 3

➢ **Save the 'untitled1' program with a new name.**

Click on the **File** menu and select **Save As…**



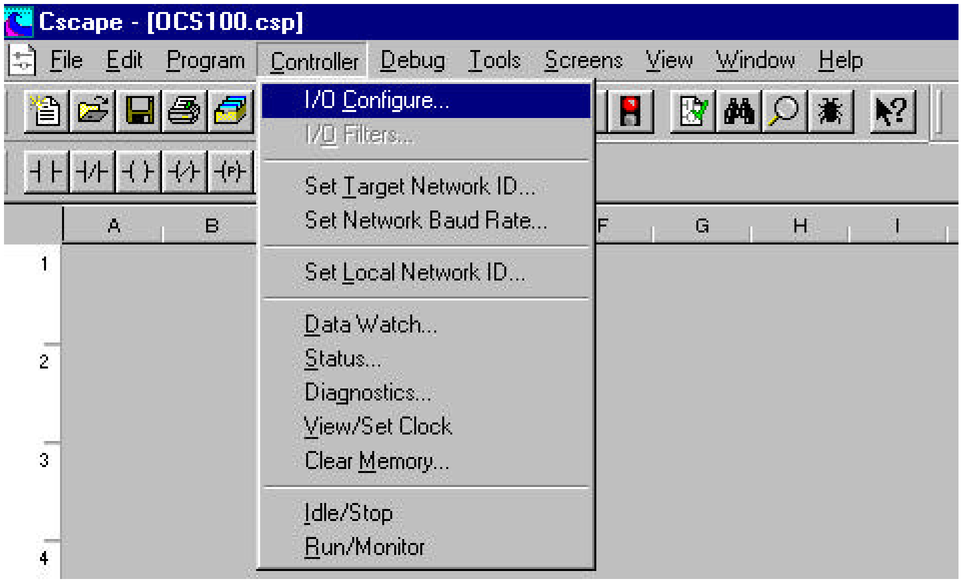
Type your program name, such as OCS100.csp, in the File Name dialog box and click the Save button.

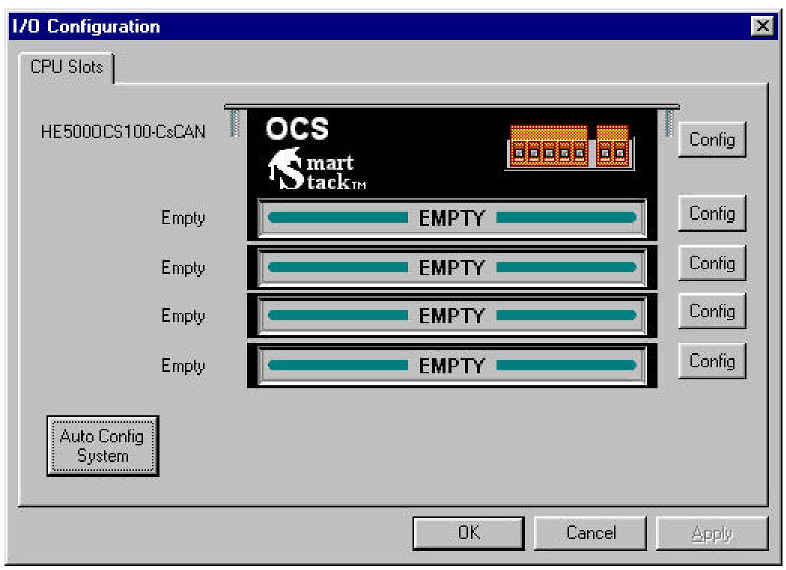


Step 4

➢ **Configure the OCS Controller**

Click on the **Controller** menu and select **I/O Configure**.



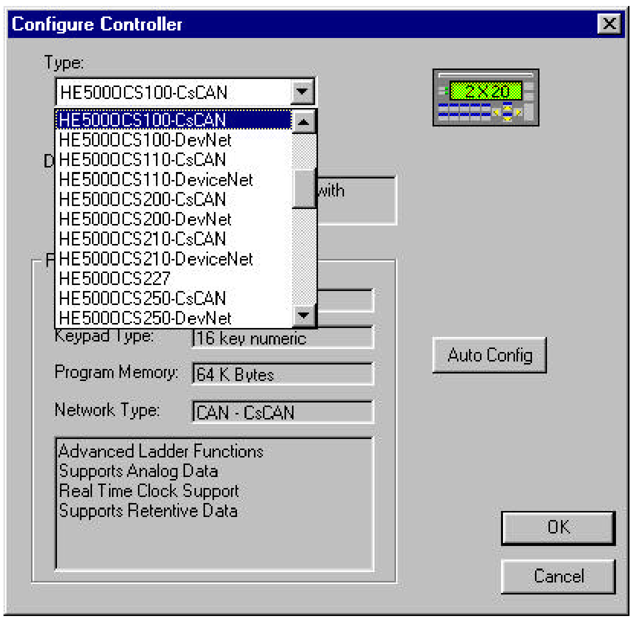


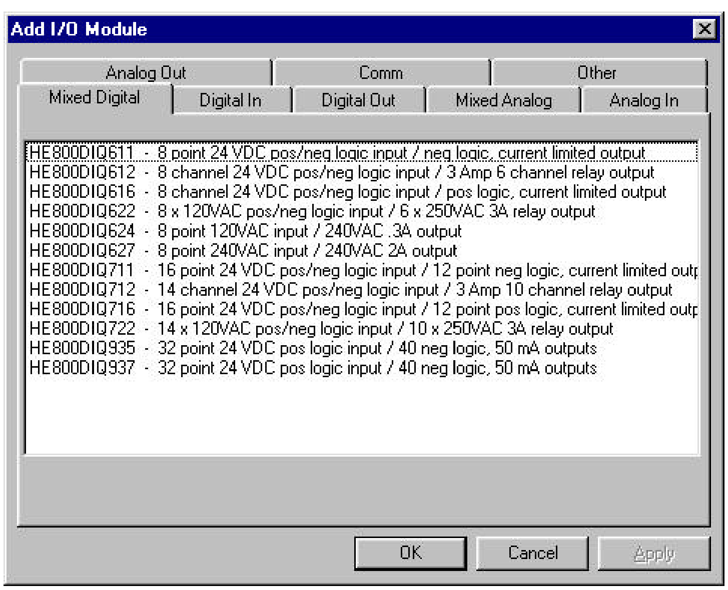
If you are online with the OCS, use the Auto Config System button. Clicking it will automatically configure the controller and any attached I/O if you are connected to the OCS properly.

Otherwise, to do it manually:

1. Double click on the controller picture.
2. Select OCS100 from the list and click OK
3. Double click on the first I/O module slot

4. Select the Mixed Digital tab
5. Select DIQ611 from the list.
6. Click OK
   (To delete or replace a module, right click on the module.)
7. Double click on the second I/O module slot
8. Select the Analog In tab
9. Select the THM100
10. Click OK
11. Click OK again to exit the I/O configuration.





Step 5
➢ **Save the program.**

Click on the **File** menu and select **Save**.

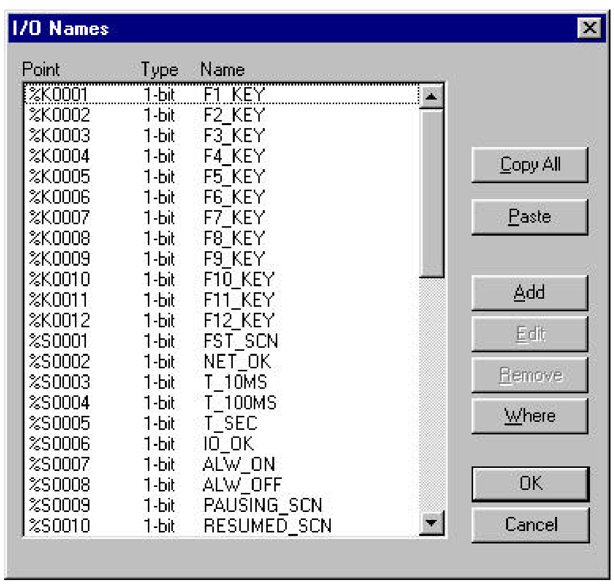
Step 6
➢ **Name some I/O points.**

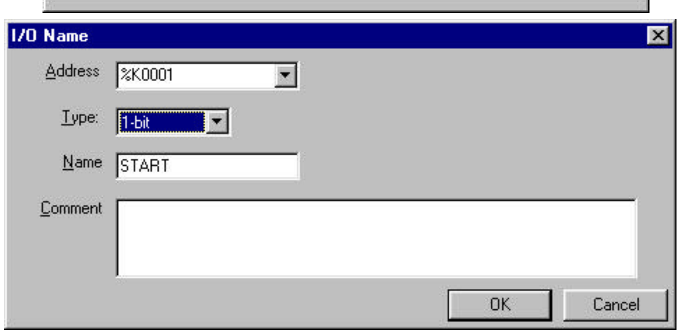
Click on the **Program** menu and select **I/O Names**.

- **Add** I/O points by clicking the 'Add' button and filling in the information.
- **Edit** an existing I/O point by finding it in the list and double-clicking it.

Add or edit the following I/O points:

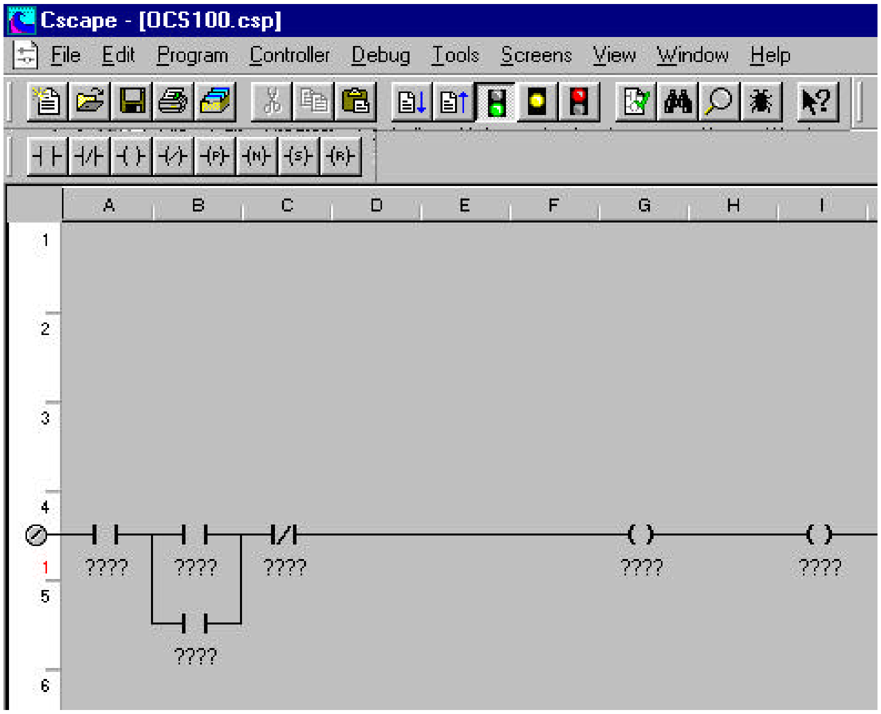
%I01	E_STOP – Configure for 1 bit
%K1	START – %K1 is named 'F1_KEY' by default so it will need to be edited instead of added. Configure for 1 bit.
%K2	STOP - %K2 is named 'F2_KEY' by default so it will need to be edited instead of added. Configure for 1 bit.
%Q1	RUN – Configure for 1 bit
%D1	Stopped_Screen – Configure for 1 bit
%D2	Running_Screen – Configure for 1 bit





Step 7

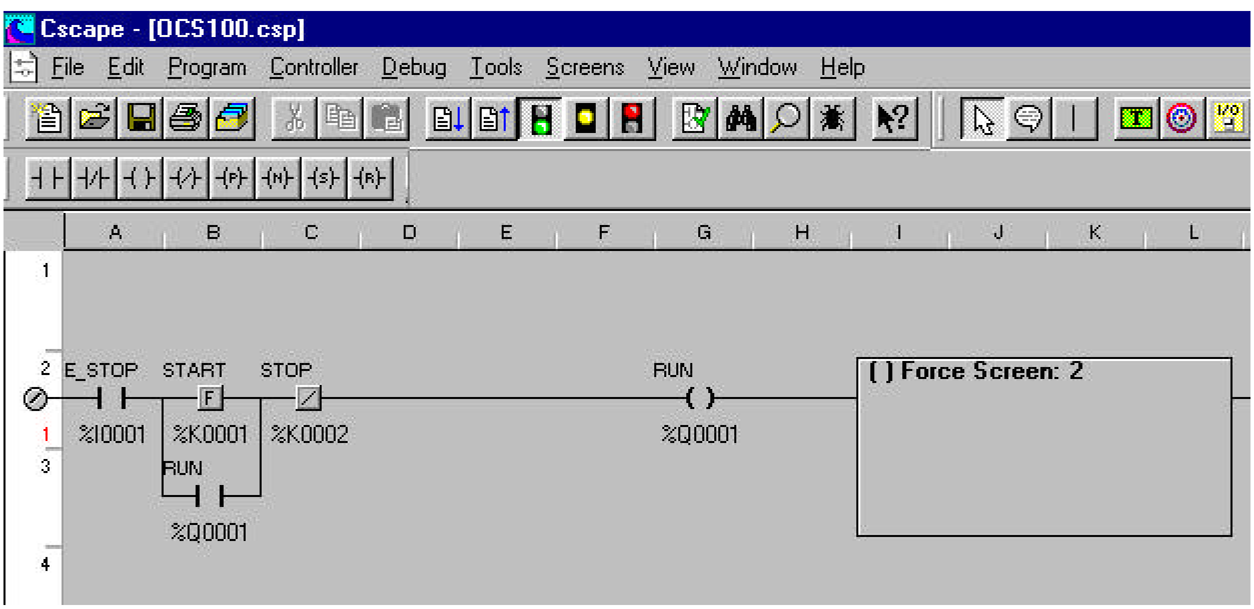
➢ **Program the following rung:**



1. Select and drop the three normally open contacts.
2. Select and drop the normally closed contact.
3. Add the vertical connecting lines.
4. Select and drop two normally open coils.

Step 8

➢ **Add the element names.**

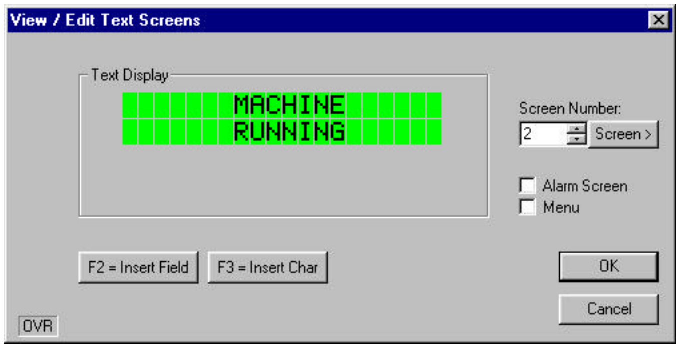


1. Double click on each element in the rung.

2. Select the name or address from the drop down list. Name the last coil %D2 and specify it as a Force Screen.
3. Click OK

Step 9

➢ **Add words to screen 2.**



1. Double click the screen in the ladder logic.
2. Click Edit Screen.
3. On the first line, type MACHINE
4. On the second line, type RUNNING
5. Right click on MACHINE
6. Select Justify Line
7. Select Center
8. Repeat on the second line
9. Click OK
10. Click OK

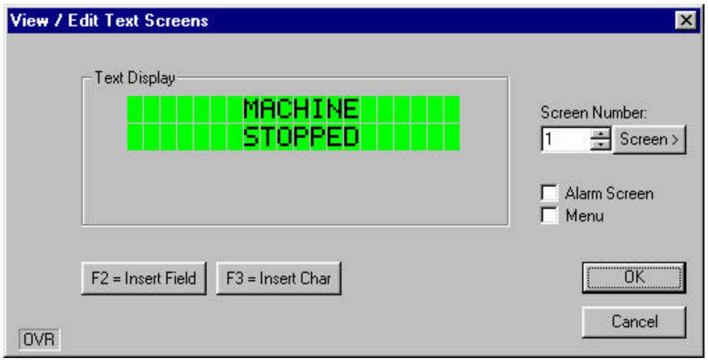
Step 10

➢ **Add Screen 1**

Note: The lowest numbered non-blank, non-alarm screen is always displayed when no screen is being forced on by the program.

1. Click on the **Screens** menu and select **View / Edit Screens…**
2. On Screen 1, Line 1 type MACHINE
3. On the second line type STOPPED

4. Right-click on each word and center it.



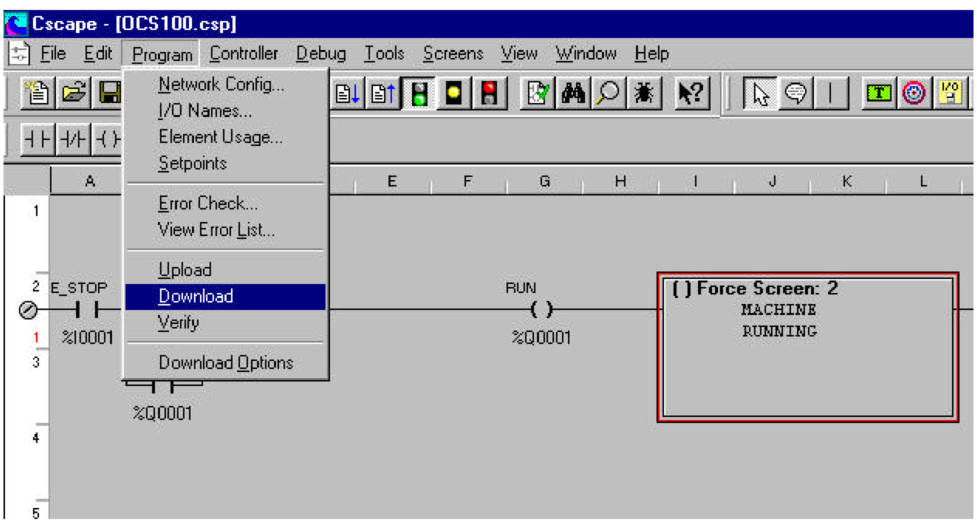
Step 11

➢ **Save the program.**

Step 12

➢ **Download the program to the OCS100.**

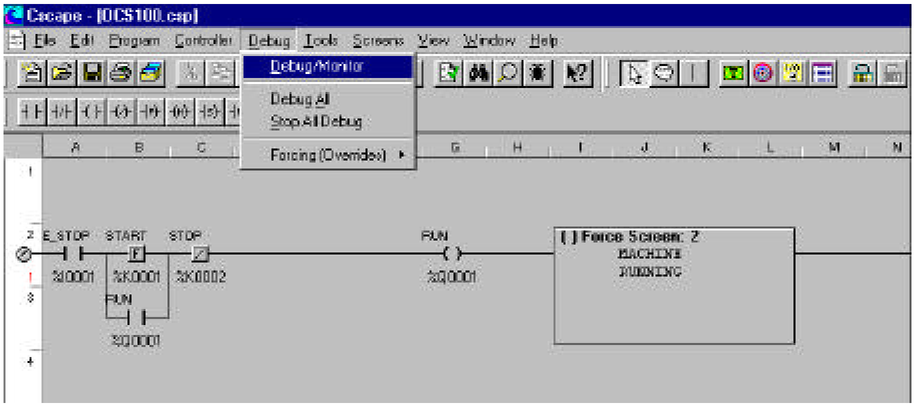
1. Select the **Program** menu and click **Download**.
2. Use the SmartLoad function when the Download dialog box appears.
3. Click OK.



Once downloaded, make sure the OCS is in Run mode (the green traffic light on the toolbar).

Step 13

➢ **Debug your program**



Click on the **Debug** and select **Debug/Monitor**

Close switch 1 on the Demo Panel.

Switch 1 is connected to the first digital input on the DIQ611 I/O card, which is addressed to %I01.

E_STOP & STOP should be red.

The screen should show MACHINE STOPPED.

Push the F1 key.

START should turn red until you release the F1 key.

The RUN coil and contact should both turn red.

The screen should change to MACHINE RUNNING.

Output 1 should turn ON

Push F2 or open switch 1.

The output should turn OFF

The screen should show MACHINE STOPPED.

CONGRATULATIONS! You have finished your first OCS program. Now move on to LAB 2 and learn additional skills.

NOTES:

LAB 2

Programming and Configuration Lab:
Text Tables

Lab 2: Text Tables

Lab 2: Text Tables

Objective:

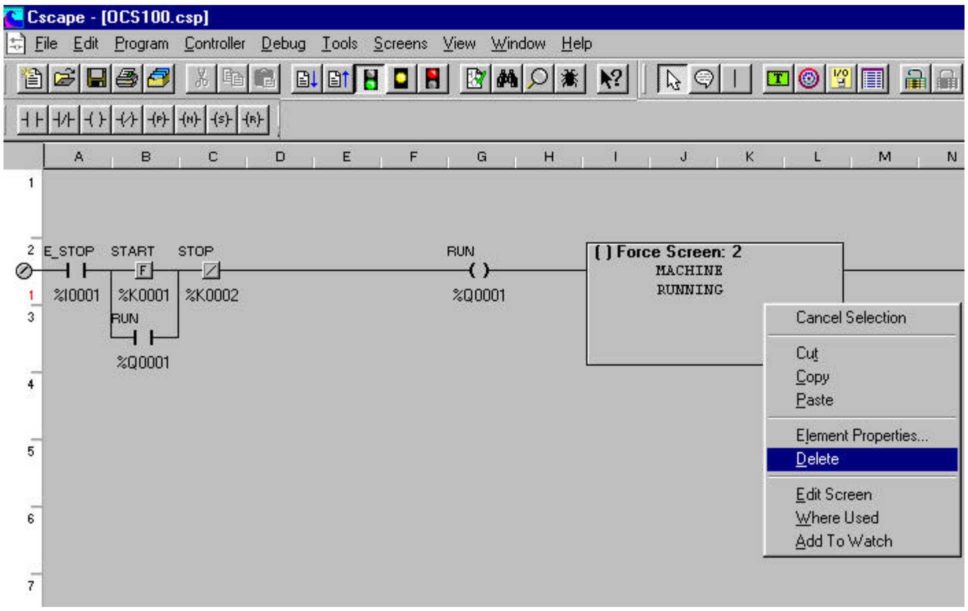
Add a variable field to screen 1 containing a Text Table and eliminate screen 2.

This lab is a continuation of LAB 1.

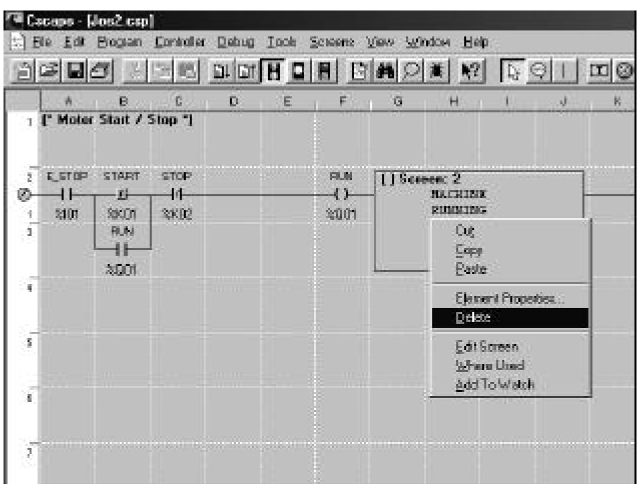
Procedure:

Step 1

➢ **Delete screen 2 from the program.**



Right click on screen 2 in the rung. Then click Delete.



Step 2

➢ **Edit screen 1.**

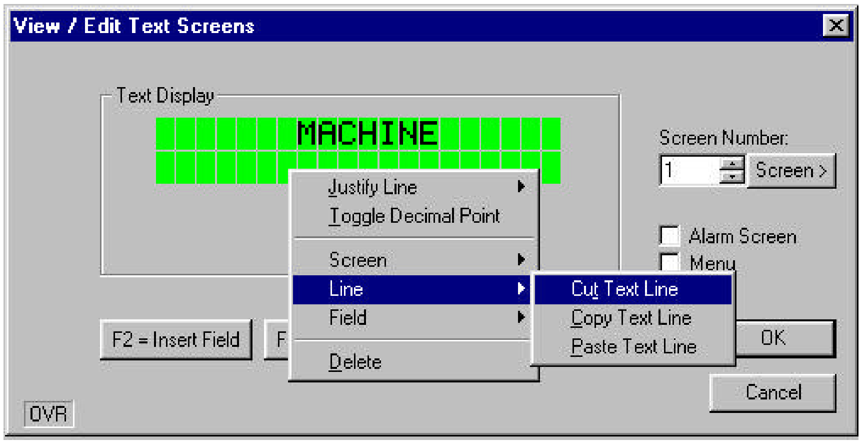
Click on **Screens**, select **View/Edit Screens**.

Lab 2: Text Tables

Step 3

➢ **Delete the word 'STOPPED'.**

1. Right click any place on the second line.

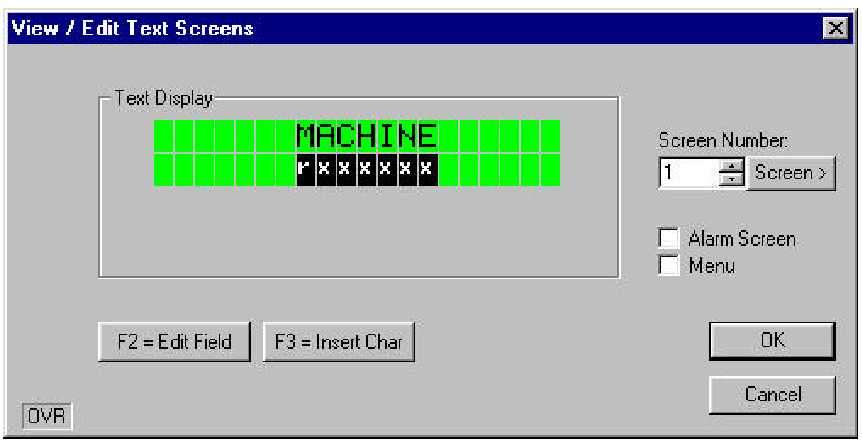


2. Select **Line** and then click **Cut Text Line**.

Step 4

➢ **Add a field.**

1. Place the cursor on the second line under the M.
2. Click on Insert Field.
3. Click in the field and drag to 7 characters wide.



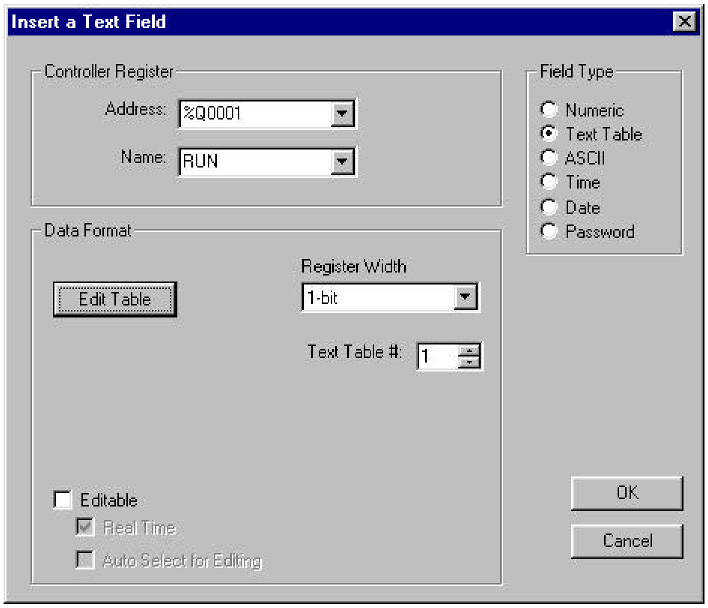
Step 5

➢ **Edit the field.**

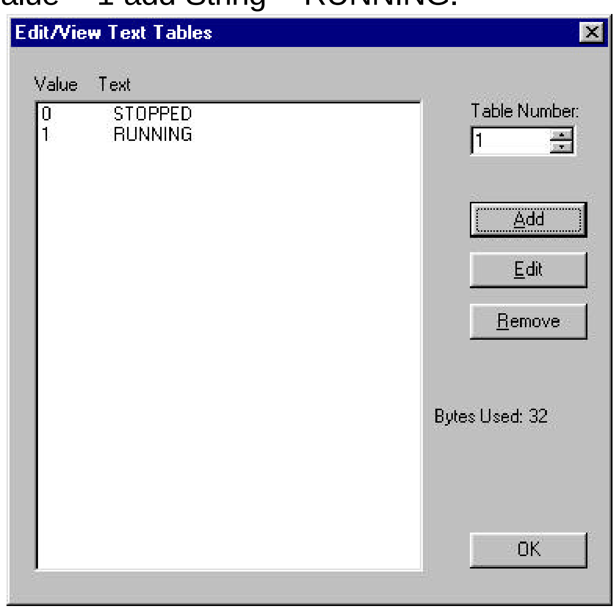
1. With the cursor anyplace in the field, click Edit Field.
2. Change Address to %Q1.
3. Change Field Type to Text Table.

Lab 2: Text Tables

4. In Data Format verify:
   Register Width = 1-bit.
   Text Table # = 1.
   Editable is not checked.



5. Click on Edit Table.
6. Click on Add.
7. For Value = 0 add String = STOPPED.
8. Click OK.
9. Click on Add.
10. For Value = 1 add String = RUNNING.



11. Click OK.
12. Click OK.

13. Click OK.
14. Click OK.

Step 6

➢ **Save the program.**

Click on **File** and select **Save**

Step 7

➢ **Download to the OCS.**

Click on **Program** and select **Download**

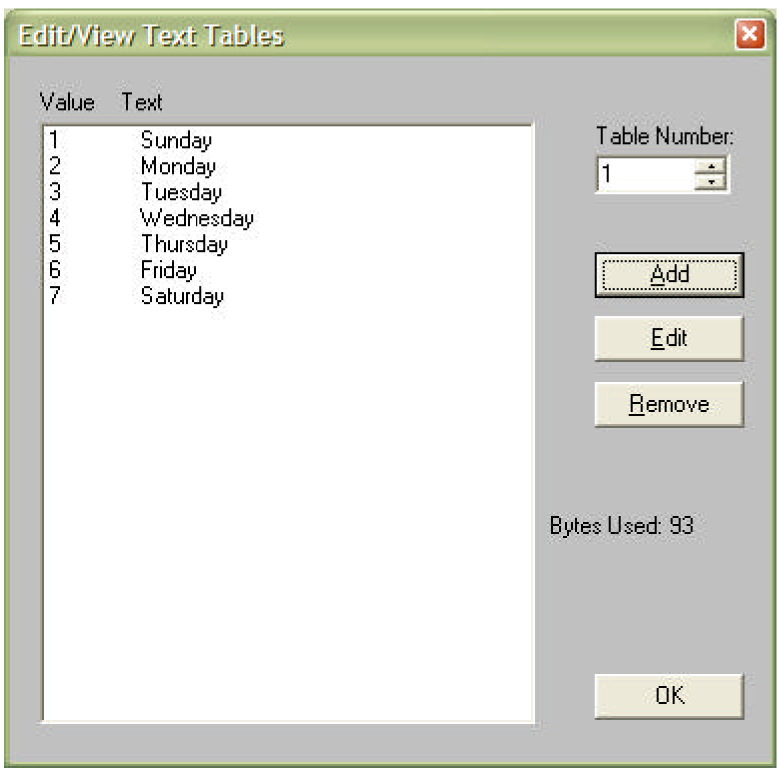
Step 8

➢ **Check the program operation.**

The program should operate exactly the same as it did before. The screen should look and act the same.

This shows some of the flexibility of the OCS and how easy it is to configure some of the screen features. Text tables can often be used in place of an entirely new screen, or simply to associate text with a number to make it easier to decipher that number.

Take, for example, the system register %SR50. This registers represents the Day of the Week for the OCS's internal Real Time Clock. It contains a value of 1-7 depending on what day it is. Linking a text table directly to %SR50 and configuring the text table as shown would display the days of the week instead of just a number:



NOTES:

NOTES:

LAB 3

Timers and Counters

Lab 3: Timers and Counters

Lab 3: Timers and Counters

Objective:

Review and understand Timers and Counters.

Timers Overview:

The purpose of the Timers portion of this lab is to show how each type of Timer operates and what the difference is between them. Also, using built-in status bits in the Timer registers can be useful in many cases instead of using additional coils in the ladder logic.

Note: You will almost ALWAYS use %R registers for Timers and Counters. And they always use 2 consecutive word-length registers!

REMEMBER! If a timer is addressed to %R1, then %R2.15 will indicate whether the timer is receiving power (for Counters and TON Timers only). %R2.16 will indicate whether the timer is passing power to the rest of the rung. In the same way, if addressed to %R846, then %R847.15 and %R847.16 are those status bits.

Part 1 – TON Timers:

1. Create a new OCS100 or OCS200 program.
2. Title the program “Timers.csp”.
3. Set the target ID to match the OCS you are going to program.
4. Configure the OCS. (Reference Lab 1 for correct procedure)
5. Configure a timer at %R1 that will pass power to a coil, %M1, when the F1 key is pressed and held for 3 seconds or more. Configure the timer for 100ms resolution.

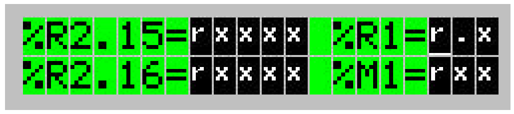
HINT: Since the timer is set for 100ms resolution, 3 seconds is equal to a “Pt” of 30. 30 100ms pulses equals 3 seconds.

6. Configure a text table on the screen to show ‘Off’ or ‘On’ depending on the state of %M1.
7. Configure a second text table to show ‘Off’ or ‘Enabl‘ depending on the state of %R2.15. %R2.15 will reflect whether or not the Timer is currently enabled.

HINT: There are up to 200 text tables to use. By default, every new text table field you make references text table 1. You will have to make new text tables and point the new text table to the appropriate table number.

8. Configure a third text table to show ‘Off’ or ‘Power’ depending on the state of %R2.16. %R2.16 will reflect whether or not the Timer is currently passing power to the rest of the ladder rung. It will pass power when the timer is done timing.
9. Configure a data field that displays how much time as elapsed in the timer. Place a decimal point in the data field in the 2nd place from the right by right-clicking on it and selecting “Toggle Decimal Point”. Since the Timer is running in 100ms resolution, a simple decimal place in that position easily divides the time.

10. Label each field on the screen so you can tell them apart. Just type in some text directly on the screen to do this. Your screen might look something like this in the screen editor:



11. Download the program to your controller and make sure it is in RUN mode. If the screen information is on a screen other than Screen 1, use the up and down arrow keys to scroll to that screen.
12. Compare the operation of %R2.15 (“Off” or “Enabled”) to the operation of the F1 key. They should be the same.
13. Compare the operation of %R2.16 (“Off” or “Power”) to %M1. They should be the same. You can use %R2.16 in place of %M1 in programming.
14. Watch the value in %R1 to see the accumulated time when F1 is pressed. Letting go of F1 before the 3 seconds is up will cause the timer to automatically reset to 0.

Part 2 – Retentive TON Timers

1. To the above program, add a timer that times and keeps track of how long the F2 key has been pressed. After the total has reached 5 seconds, the timer should pass power… unless the F5 key is pressed to reset the accumulated time. Configure the Timer for 10ms resolution.

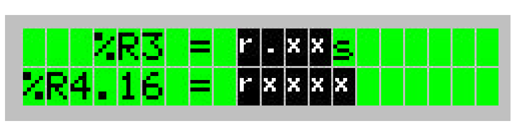
HINT: Since this timer is set for 10ms resolution, 5 seconds is equal to a ‘Pt’ of 500. 500 10ms pulses equals 5 seconds.

HINT: Remember; each Timer or Counter takes 2 word-length (%R) registers. The timer from Part 1 takes up %R1 and %R2. Don’t overlap this timer with that one!

2. Configure a text table on the screen to show ‘Off’ or ‘On’ depending on the state of the Timer “Passing Power” status bit. (You may have to start a new screen.)

HINT: Since you have already created a text table for %R2.16 with ‘Off’ and ‘Power’, you can link this timer’s status bit to the same text table. Two different registers can use the same text table.

3. Configure a data field that displays how much time has accumulated in the timer. Place a decimal point in this field, but place it in the 3rd position from the right this time.
4. Again, label each field so that you can tell them apart. Your screen might look something like this:



5. Download the program to your controller and make sure it is in RUN mode. If the screen information is on a screen other than Screen 1, use the up and down arrow keys to scroll to that screen.

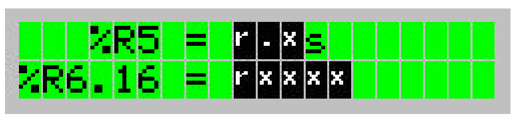
6. Press the F2 key and watch the time increment. Let go before the 5 seconds is up and the time should stay where it is. Pressing F2 again will resume where it left off. You will have to press F5 to get the timer to restart at 0 again.

Part 3 – TOF Timers

1. To the above program, add a timer that will immediately pass power when the F3 key is pressed and will keep passing power for 5 seconds after the F3 key is released. Configure this timer for 100ms resolution.

HINT: Remember not to overlap the timers! Use the Timer Status bit to determine when the timer is passing power.

2. Configure a text table on the screen to show ‘Off’ or ‘Power’ depending on the state of the timer’s status bits to show when the timer is passing power. (You may have to start a new screen and, remember, you can re-use the text table you already have for ‘Off’ and ‘Power’.)
3. Label everything:



4. Download and make sure the controller is in RUN mode. If the screen information is on a screen other than Screen 1, use the up and down arrow keys to scroll to that screen.
5. Notice how this timer shows 5.0 seconds in its accumulated time when it is inactive, but the status bit shows ‘Off’ because power is not being passed.
6. Notice how the accumulated time goes to 0.0 when you press the F3 key and the status bit shows ‘Power’ immediately.
7. Notice how the accumulated time then starts counting when you let go of the F3 key and how the status bit still shows ‘Power’ to the rest of the ladder rung, even though power to the rung has been interrupted.
8. Notice how power is discontinued when the timer reaches its 5 seconds.

Counters Overview:

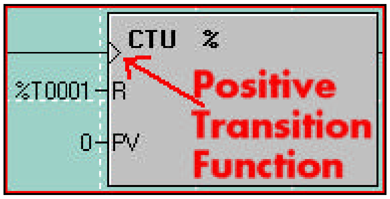
The purpose of the Counters portion of the lab is to demonstrate how Counters work and what the difference is between a Count-Up (CTU) Counter and a Count-Down (CTD) Counter.

Count-Up counters reset to 0 and count up from there, passing power when they reach their preset value (PV).

Count-Down counters reset to their preset value (PV) and count down from there, passing power when they reach 0.

Status bits in the Counter's second register work the same way as the Timer's status bits.

Counters increment or decrement only once every time they see power come on from the ladder rung. This is what the little triangle at the counter input means:

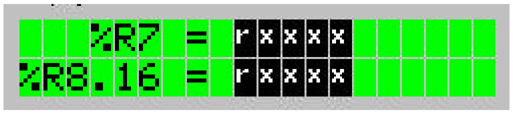


Part 4 – CTU Counters

1. To your program, add a counter that will count the number of times the F4 key has been pressed. If F4 is pressed a total of 4 times or more, power should be passed to the rest of the rung.

HINT: Just like Timers, Counters also take up 2 word-length (%R) registers. Don't step on any of your timers!

2. Make the F5 key reset the counter.
3. Create another screen with a data field and a text table to show the counter's accumulated count and its status bit to let you know whether or not it is passing power. Your screen might look something like this:

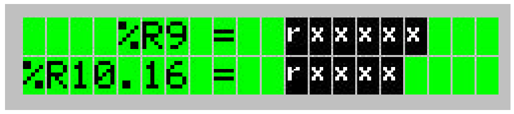


4. Download and make sure the controller is in RUN mode. If the screen information is on a screen other than Screen 1, use the up and down arrow keys to scroll to that screen.
5. Press the F4 key and watch the count increment. When it reaches 4, power should be passed. Pressing F5 will reset the counter regardless of where it is in the count.
6. Notice how the counter continues to count past its preset value if you keep pushing the F4 key. It will continue to count and will also pass power until it is reset.
7. Notice how the counter's status bit acts the same as the timer status bit.

Lab 3: Timers and Counters

Part 5 – CTD Counters

1. To your program, add another counter that will count the number of times the F6 key is pressed. However, use a CTD counter to count down from 4. Use the F7 key to reset the counter.
2. Create another screen to monitor this counter, just like you have for all the other timers and counters. However, make sure the data field for the accumulated count is set up for 6 digits and make sure it is set up for a 'Signed Decimal' display format:



3. Download and make sure the controller is in RUN mode. If the screen information is on a screen other than Screen 1, use the up and down arrow keys to scroll to that screen.
4. Make sure the counter is reset by pressing the F7 key. Notice how it resets to the preset value.
5. Press the F6 key and watch the count value decrement. When the count reaches 0, power will be passed.
6. Notice how the counter will continue to decrement past 0. Depending on how you have your data field set up, it will either show -1, -2, -3, etc. (Signed Decimal display format), or it will show 65535, 65534, 65533, etc. (Decimal display format, also known as Unsigned Decimal).

Extra Credit

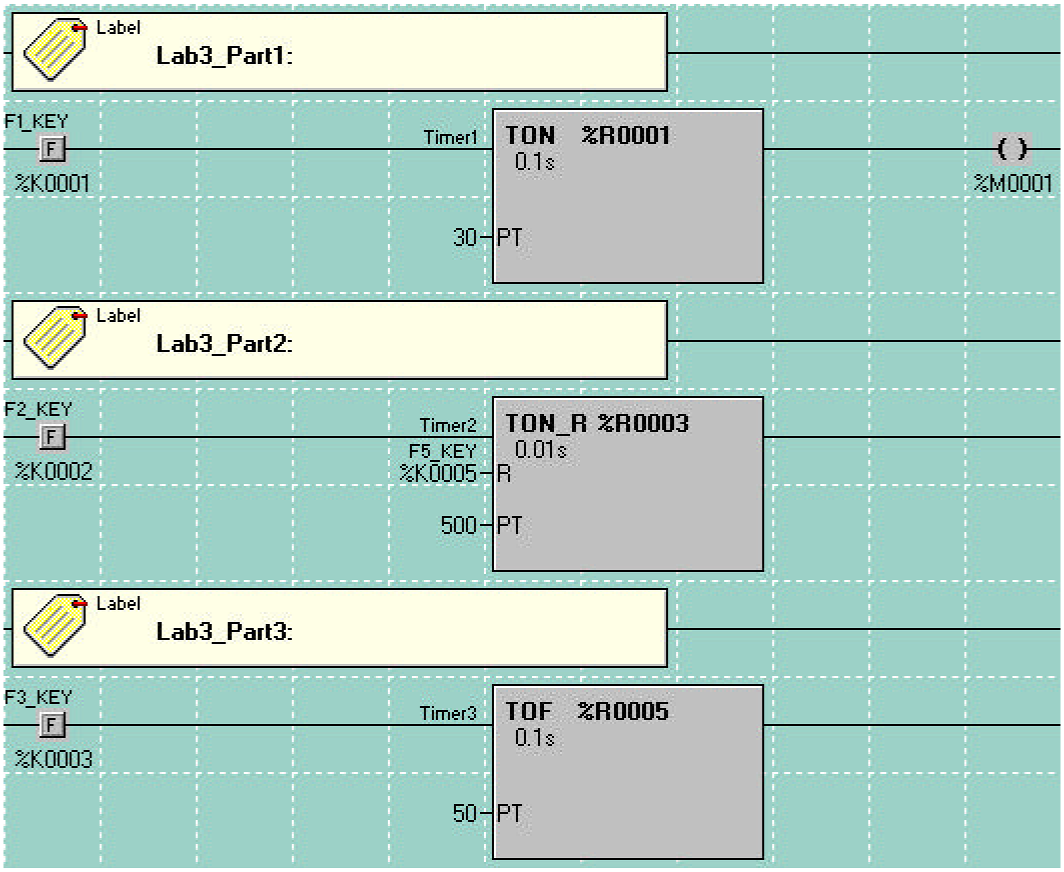
For each type of timer or counter, write ladder logic that will switch to the appropriate screen based on which F-key you press. For example, if you have made 5 screens for each of the 5 parts of this lab, make F1 switch to your TON screen, F4 switch to your CTU screen, and so on.

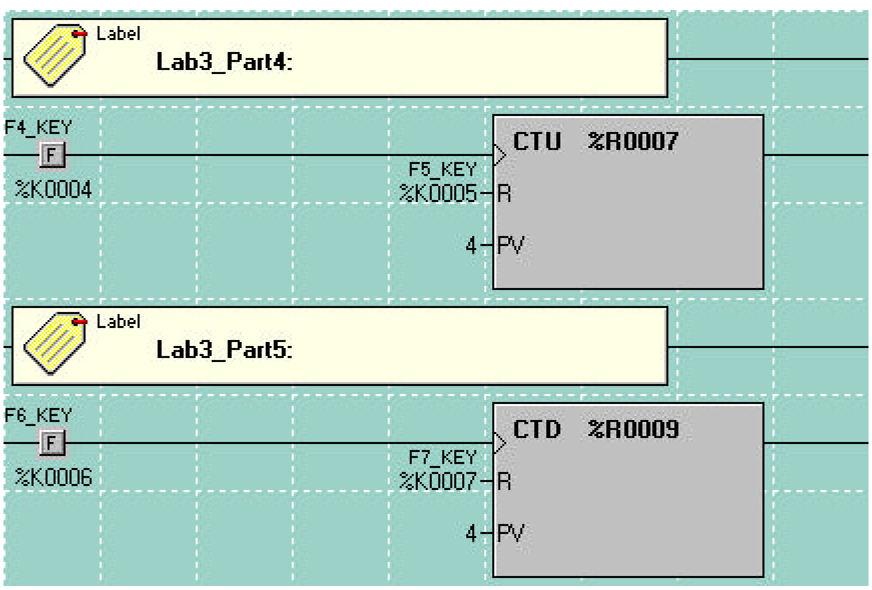
HINT: Remember that %D coils correspond to the screen numbers.

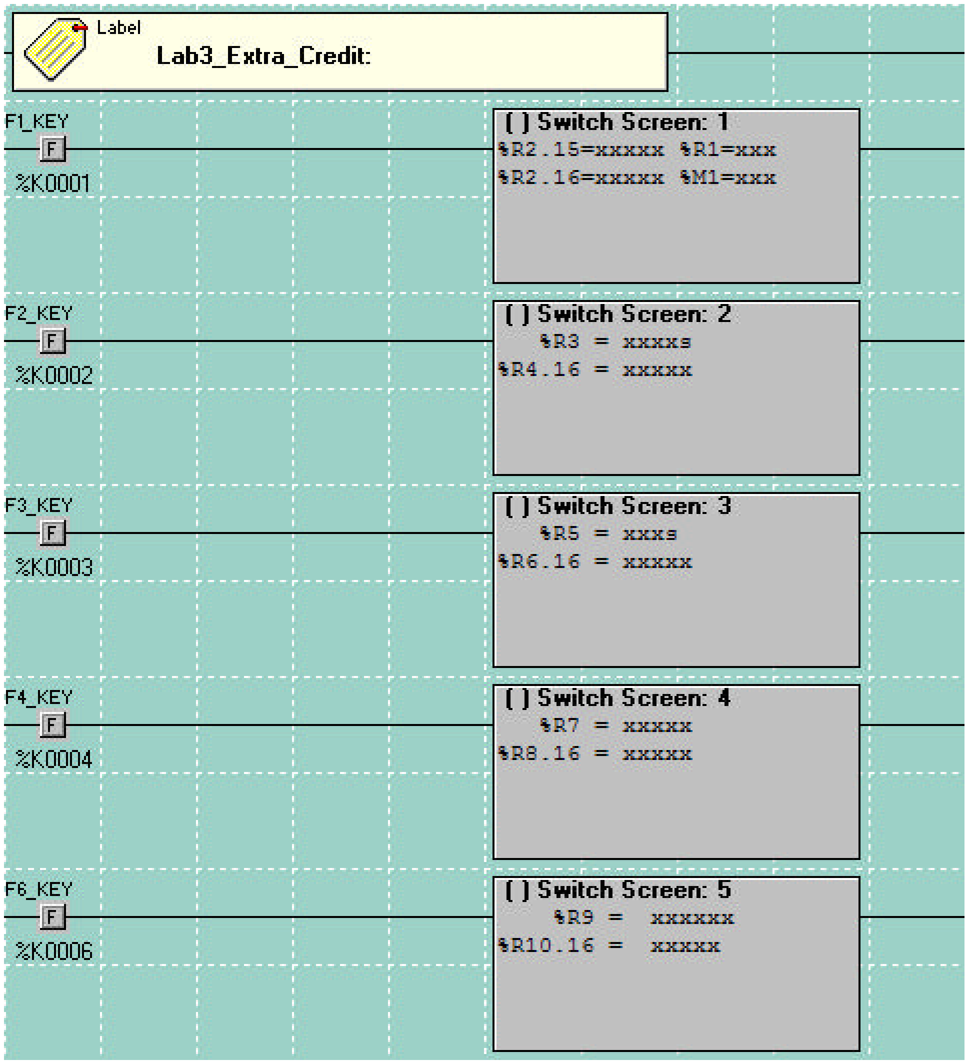
CONGRATULATIONS, YOU'VE FINISHED TIMERS AND COUNTERS!

Lab 3: Timers and Counters

Solutions for Lab 3:







Label
Lab3_Extra_Credit:
F1_KEY
%K0001
( ) Switch Screen: 1
%R2.15=xxxxx %R1=xxx
%R2.16=xxxxx %M1=xxx
F2_KEY
%K0002
( ) Switch Screen: 2
%R3 = xxxxs
%R4.16 = xxxxx
F3_KEY
%K0003
( ) Switch Screen: 3
%R5 = xxxs
%R6.16 = xxxxx
F4_KEY
%K0004
( ) Switch Screen: 4
%R7 = xxxxx
%R8.16 = xxxxx
F6_KEY
%K0006
( ) Switch Screen: 5
%R9 = xxxxxx
%R10.16 = xxxxx

NOTES:

LAB 4

Move Operations

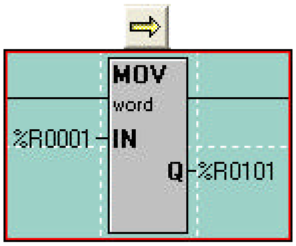
Lab 4: Move Operations

Lab 4: Move Operations

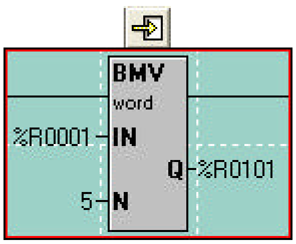
Objective:

Review and understand Move Operations
Overview:

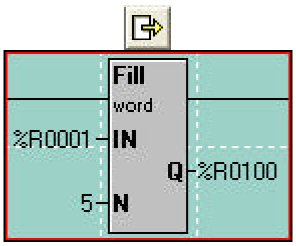
There are several types of Move functions available for use for several types of different occasions. The 'Move Operations' toolbar appears as follows:



The first type of Move is the 'Move Word', or 'MOV'. It is used to copy a single byte, word or double-word from one location to another. The count is locked at 1. In the case of the example to the left, the value in %R1 is copied into %R101. This only happens when the ladder rung receives power. The value in %R101 is NOT taken back out when power is lost to the rung. The IN can be either a register or a constant value.

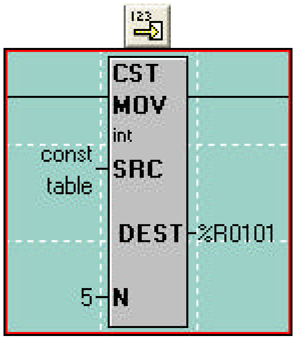


The next type of Move is the 'Move Data Block', or 'BMV'. It is used to copy a group of bytes, words or double-words to another location. The count (N) determines how many registers are to be copied. In the example to the left, %R1-%R5 are copied into %R101-%R105. Again, this only happens when the ladder rung receives power. The IN must be a register reference and constant values are not allowed.

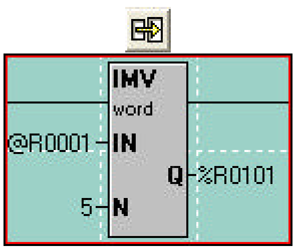


The next type of Move is the "Fill WORD", or "Fill". It is used to copy the contents of a single register or value into multiple other registers, thus filling that one value into a group of registers. The count (N) determines how many registers to fill that single value into. In the example to the left, the value in %R1 is copied into %R101-%R105 so that %R101-%R105 all will have the same value in them. This can be used to zero-out a group of registers. The IN can be either a register or a constant value.

Lab 4: Move Operations

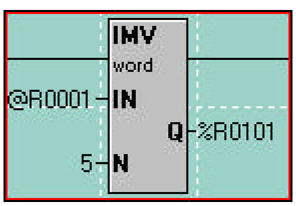


Skipping to the 'Constant Move', or 'CST MOV', it is used to move a group of constant values into a group of consecutive registers. If, for example, you want to move the values 1, 2, 3, 4 and 5 into %R101, %R102, %R103, %R104 and %R105, respectively, then you can use the Constant Move function. The count (N) is automatically determined by how many constant values you enter into the configuration for this function. The source data can ONLY be constant data and cannot be register references.

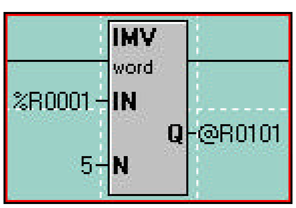


Moving back one to the 'Indirect Move', or 'IMV', it is used to move data from variable positions or to variable positions or both. It functions, for the most part, like the Block Move function. If specified as Indirect, the IN and/or the Q are used as pointers to where in the %R registers to get data from or put data to. When looking at the ladder logic, the @ symbol will appear next to the IN or Q address if it is specified as Indirect. This function can and most likely will get hairy to the uninitiated. It is most handy, though, when data-logging to register memory.

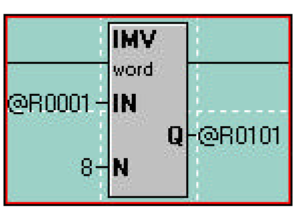
Indirect Move Examples



In this example, the IN is specified as Indirect. This means the controller will look at %R1 and see a value within it. If %R1 has a value of 501 in it, the controller will go to %R501 to get the source data. 5 registers will then be moved from %R501-%R505 to %R101-%R105.



In this example, the Q is specified as Indirect. This means the controller will look at %R101 and see a value within it. If %R101 has a value of 851, the controller will take the data in %R1-%R5 and move it into %R851-%R855.



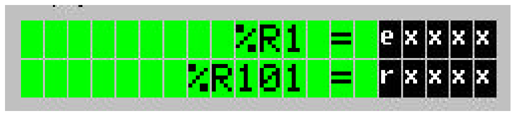
In this example, the Mother of All Confusion, both the IN and the Q are specified as Indirect. This means the controller will look at %R1 and see a value. Let's say it is 241. The controller also looks at the value in %R101. Let's say it is 341. The controller will then take the values in %R241-%R248 and move them into %R341-%R348.

Confused yet? Good, let's get on with the lab.

Lab 4: Move Operations

Part 1 – Move

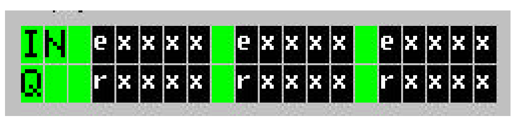
1. Start a new program for the controller you are connected to and call it whatever you want. Configure the controller and I/O as you have done before.
2. Move the value in %R1 to %R101 when the F6 key is pressed.
3. Move the value of 0 into %R101 when the F7 key is pressed.
4. Create a screen with data fields that show %R1 and %R101 and label them. Be sure to make the %R1 data field editable:



5. Download the program and make sure the controller is in RUN mode.
6. Edit the value in %R1 to whatever you like by pressing the Enter key when the cursor is under that field, typing in a value on the OCS keypad, and then pressing Enter again.
7. Press the F6 key to move the value you just edited into %R101.
8. Press the F7 key to move a value of 0 into %R101.

Part 2 – Block Move

1. Add programming to move the values in %R11-%R13 to %R111-%R113 when the F8 key is pressed.
2. Create another screen with data fields to show the registers. Be sure to make the %R11, %R12 and %R13 data fields editable:

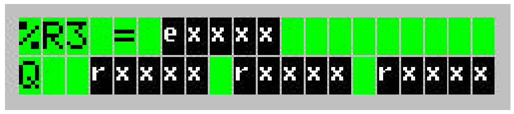


3. Download the program and make sure the controller is in RUN mode. If the screen you configured is not Screen 1, then use the up and down arrow keys to move to your screen.
4. Edit the values in %R11-%R13 to whatever you like. Use the arrow keys to select a field, press the Enter key when the cursor is under that field, type in a value on the OCS keypad, and then press Enter again.
5. Press the F8 key to move all the values you just edited in %R11-%R13 to %R111-%R113.

Part 3 – Fill WORD

1. Add programming to fill the value contained in %R3 into all the registers from %R121-%R123 when the F9 key is pressed.
2. Fill those same registers with a value of 0 when the F10 key is pressed.

3. Create another screen with data fields to show the registers. Be sure to make the %R3 data field editable:

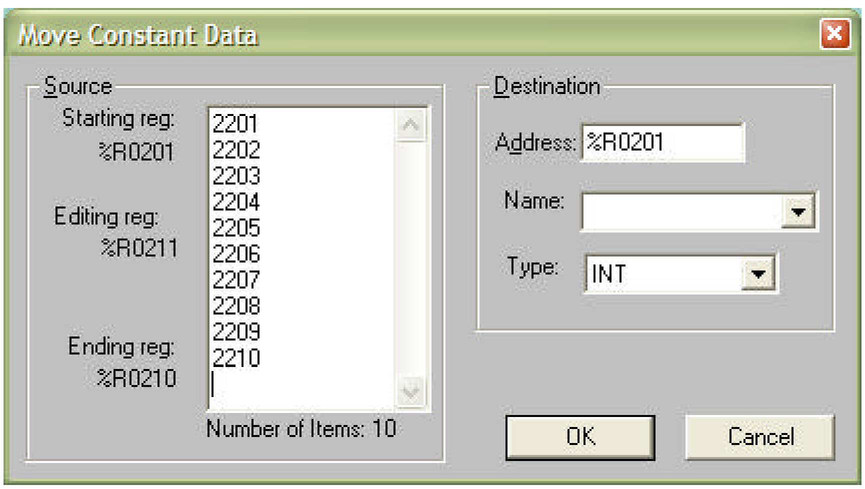


4. Download the program and make sure the controller is in RUN mode. If the screen you configured is not Screen 1, then use the up and down arrow keys to move to your screen.
5. Edit the value in %R3 to whatever you like.
6. Press the F9 key to fill the value you just edited into %R121-%R123.
7. Press the F10 key to zero out the values in %R121-%R123

Part 4 – Constant and Indirect Moves

1. Using the Constant Move, add programming that will move the values of 2201-2210 into registers %R201-%R210 on First Scan.

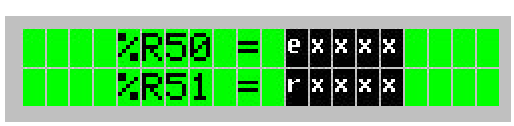
HINT: On your Cheat Sheet, find the %S register that is the system coil for First Scan.



2. Add an Indirect Move to your program that is powered with an Always-On system contact.

HINT: Use that Cheat Sheet to find the Always-On contact!

3. Use the value in %R50 as the "from" address, or pointer. This means you will have to check the Indirect option in the Source area. Use %R51 as the destination register. Do NOT check the Indirect option for the Destination.
4. Create a screen with data fields showing %R50 (editable) and %R51:



5. Edit the value in %R50 to equal something between 201 and 210. You will be able to see the values in %R201-%R210, moved with your Constant Move function, in %R51, based on the value in %R50.

Extra Credit

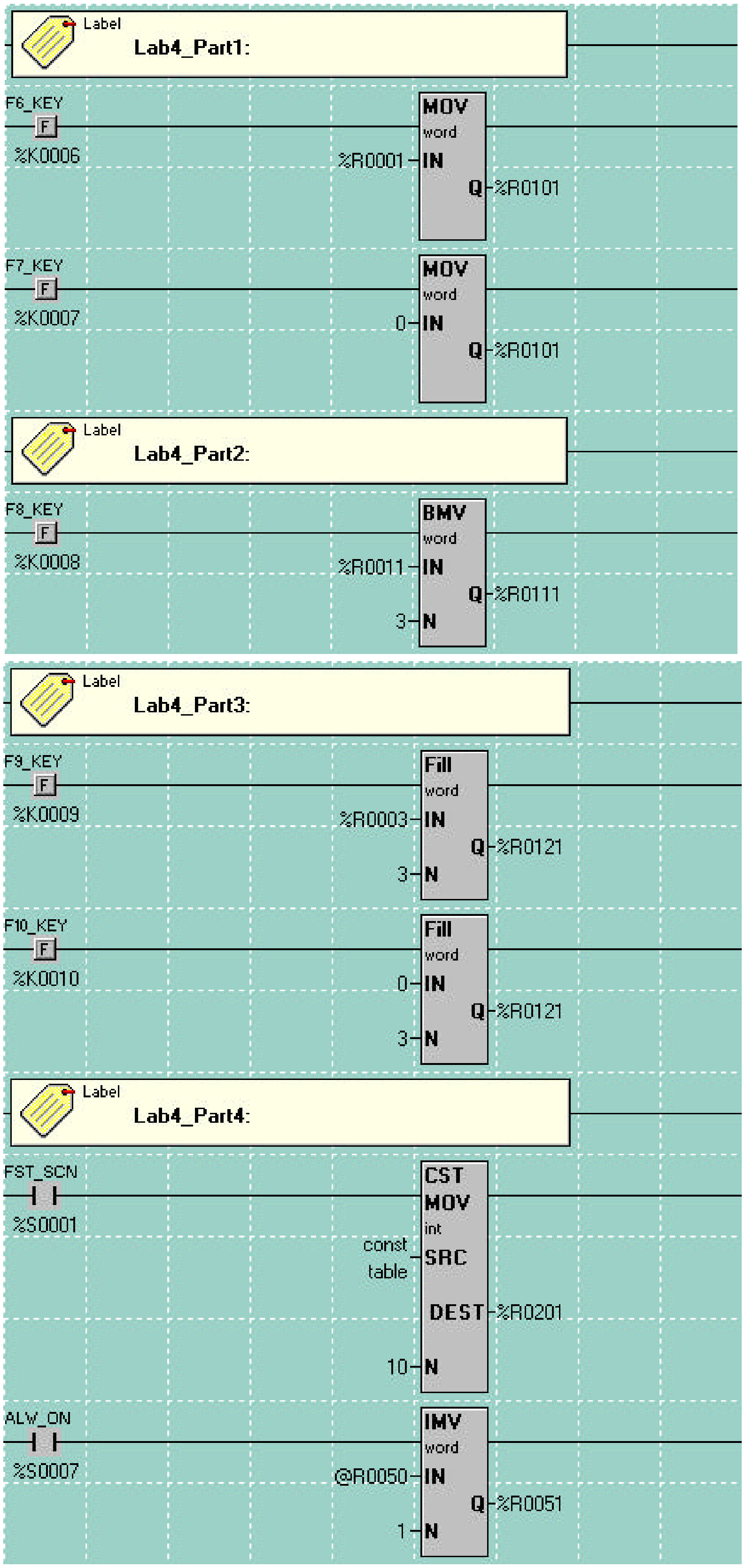
Use a Move Word function and the F1, F2, F3 and F4 keys to change between your screens in the program. F1 should change to the screen with the Move Word information, F2 should change to the screen with the Block Move information, and so on.

HINT: Use your Cheat Sheet to find the %SR System Register for User Screens. You can move a constant value corresponding to the screen you want directly into this system register. A value of 1 will change to screen 1, a value of 2 will change to screen 2, etc.

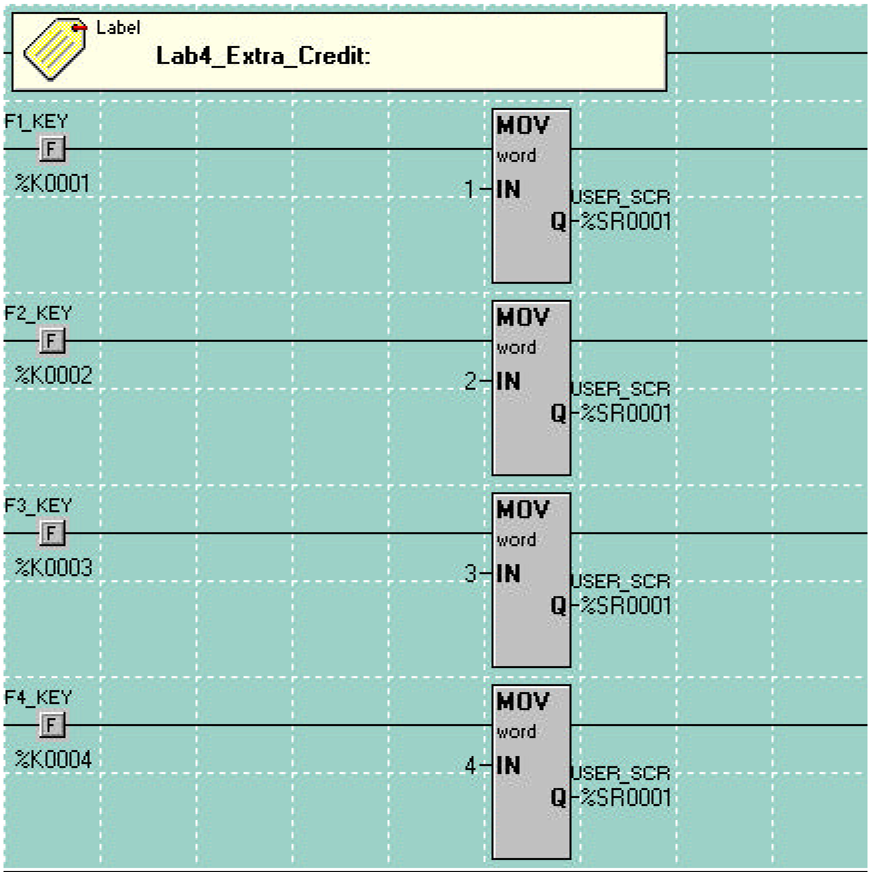
CONGRATULATIONS, YOU'VE FINISHED THE LAB ON MOVE FUNCTIONS!

Lab 4: Move Operations

Solutions for Lab 4:



Lab 4: Move Operations



NOTES:

LAB 5

CsCAN Basic Networking

Lab 5: Basic CsCAN Networking

Objective:

Review and Understand global data transfer from OCS-to-OCS over CsCAN.

Procedure:
Part 1 - Analog Data Over CsCAN

Step 1

➢ **Create new OCS100 program.**

1. Title the OCS100 program “OCS100 CsCAN”.
2. Set the target to node id 1. Verify through the system menu of the OCS100 that the node address is set to 1 and that the baud rate is 125K.
3. Configure the OCS100. (Reference Lab 1 for correct procedure)
4. Write a ladder program to increment a counter every 1 second. Assign the counter to %R1. The counter should be configured to count to 200. Use the 16th bit of the second word of the counter, %R2.16, to reset the counter upon the counter reaching the preset value. Remember that the counter will occupy 2 registers so the counter will consume % R1 – R2.

HINT: %S5 is a system register that pules every second

5. Move the accumulated value of the counter, %R1, to %AQG1. This will broadcast the counter value onto the CsCAN network. Allowing other nodes on the network to read the information.
6. Configure screen 1 to display “Outgoing Data” on the first line of the display and display the data for %AQG1 on the second line of the display. (Reference Lab 1 for help on configuring screens.)
7. Configure %AQG1 to broadcast the data every .5 seconds. AQG data defaults to broadcast data on a change of 10. So if this is not configured correctly, the OCS200 AIG data will be updated when the value of %AQG1 changes by 10.
8. To configure the network, click on the **Program** menu and select **Network Config**. Select the AQG tab and configure %AQG1
9. Save the program to the PC and then download the program to the OCS100.

Step 2

➢ **Create new OCS200 program.**

1. Title the OCS200 program “OCS200 CsCAN”.
2. Set the target to node id 2. Verify through the system menu of the OCS200 that the node address is set to 2 and that the baud rate is 125K.
3. Configure the OCS200. (Reference Lab 1 for correct procedure)
4. Configure the network to read the information from node 1 into %AIG1.

   To configure the network, click on the **Program** menu and select

Network Config.

Select the AIG tab and configure %AIG1 to for node id 1, remote %AQG1.

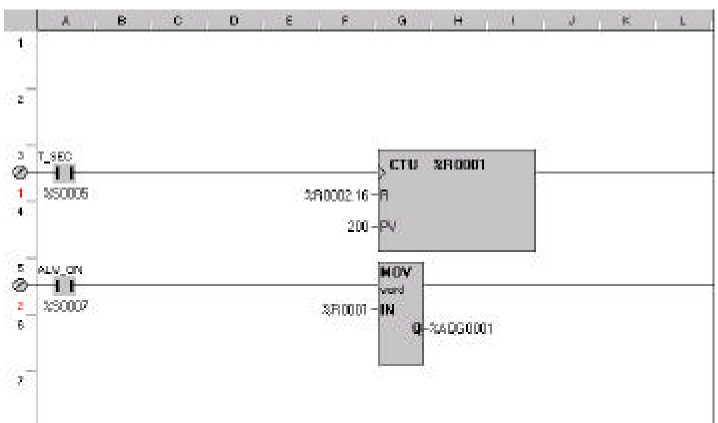
5. Configure Screen 1 to display “Incoming Data” on the first line and configure a data field on the second to display %AIG1. (Reference Lab 1 for help on configuring screens.)
6. Save the program and then download the program to the OCS200.

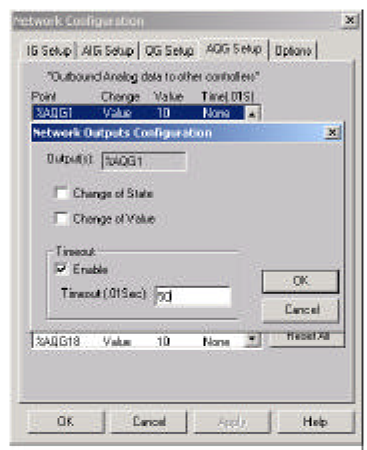
Step 3

➢ **Verify the program’s functionality.** The OCS200 should display the same value that the OCS100 is displaying on the screen.

Note the OCS200 RUN LED will blink due to the fact that no ladder program has been down loaded to the controller.

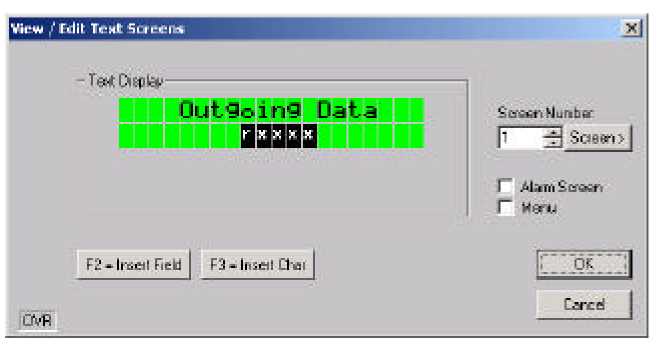
➢ **Part 1 Solution.**



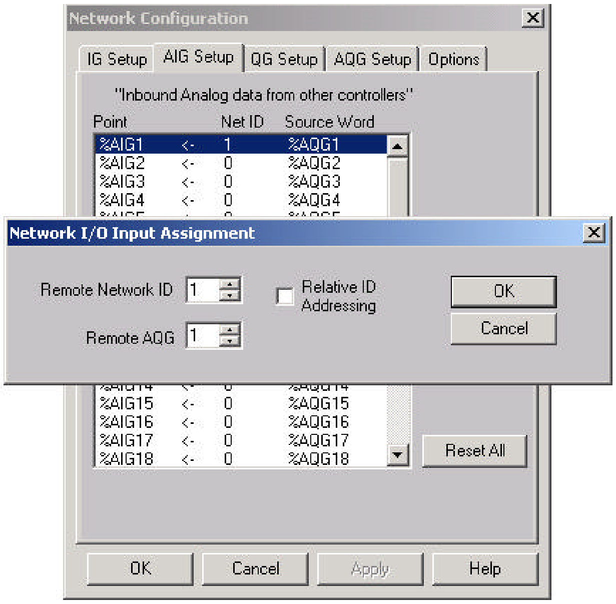


OCS100 Ladder Program

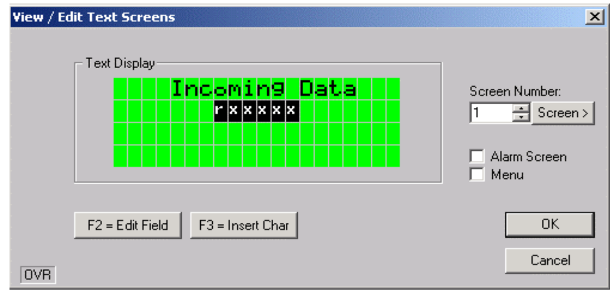
OCS100 Network Config



OCS100 Screen 1



OCS200 Network Config



OCS200 Screen 1

Part 2 – Digital Data Over CsCAN

Step 1

➢ **<u>Modify OCS200 Program</u>**

1. Map function keys %K1 - %K8 to %QG1 - %QG8. An example would be a normally open coil for %K1 driving a normally opened coil %QG1. This will allow the OCS100 to read data from the OCS200 from the CsCAN network.
2. Save the program and then download the program to the OCS200.

Step 2

➢ **<u>Modify the OCS100 Program</u>**

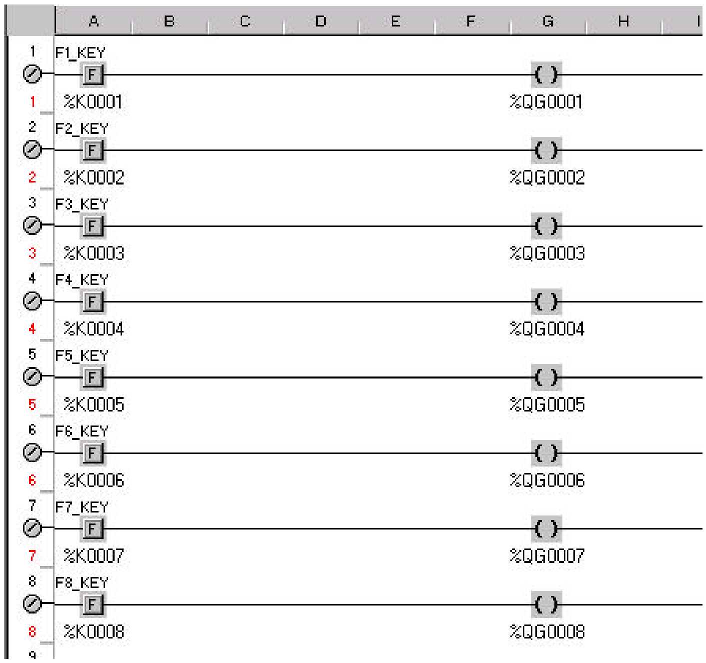
1. Configure the OCS100 Network Map to read %QG1 - %QG8 from node id 2 into %IG1 - %IG8. To configure the network, click on the **Program** menu and select **Network Config.** Select the IG tab and configure %IG1 - %IG8, %IG1 will be mapped to node id 2's %QG1 and so on.
2. Modify the ladder program to map %IG1 - %IG8 to %Q1 - %Q8. An example would be a normally open coil for %IG1 driving a normally opened coil %Q1. This will turn on the LED's on the front of the OCS100 demo box when the global inputs are active.

Step 3

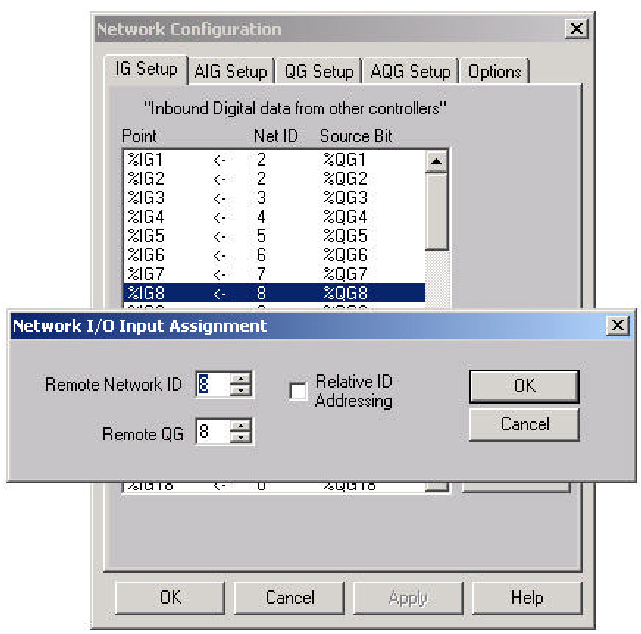
➢ **Verify the program's functionality.**

When F1 of the OCS200 keypad is pressed, LED 1 of the panel, LED 1 that is connected to the OCS100 output card, will illuminate.

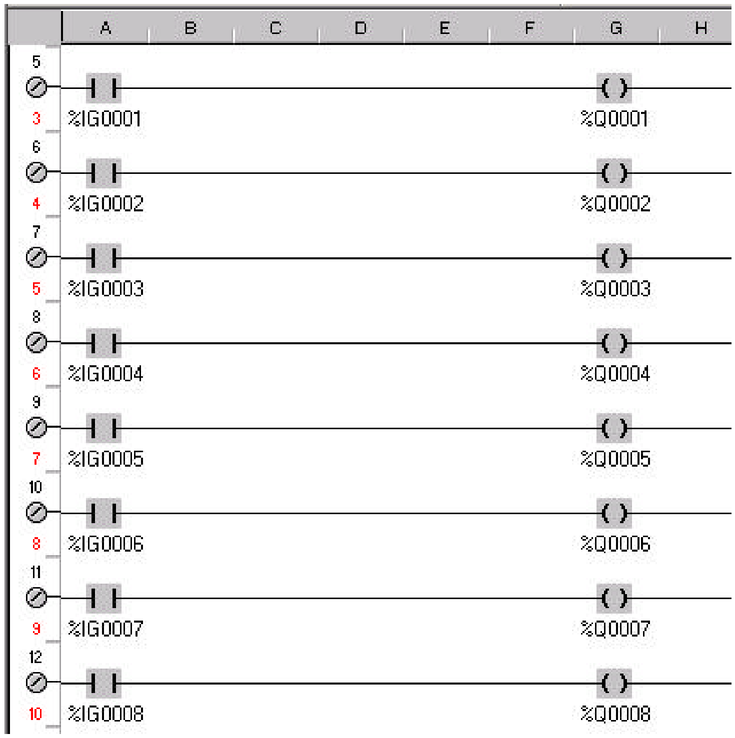
➢ **Part 2 Solution**



OCS200 Ladder



OCS100 Network Config.



Ladder Added to the OCS100

NOTES:

LAB 6

Advanced CsCAN Networking

Lab 6: Advanced CsCAN Networking

Objective:

Review and understand more advanced global data transfer from OCS-to-OCS over CsCAN utilizing the Net Put and Net Get ladder instructions.

Overview:

The OCS products have the ability to be configured for multiple node ID's. This allows the program to broadcast more than the 64 discrete data and 32 word data that a single node can normally handle. Utilizing the additional broadcast data requires the broadcasting unit to be configured for multiple node ID's and the use of the Net Put function. Receiving more than 64 discrete and 32 word data doesn't require the receiving unit to be configured for multiple node ID's, but does require the use of the Net Get ladder function.

Note: Start 2 new programs for the OCS100 and the OCS200. By this point, you have configured screens for both units so screen configuration is up to the programmer.

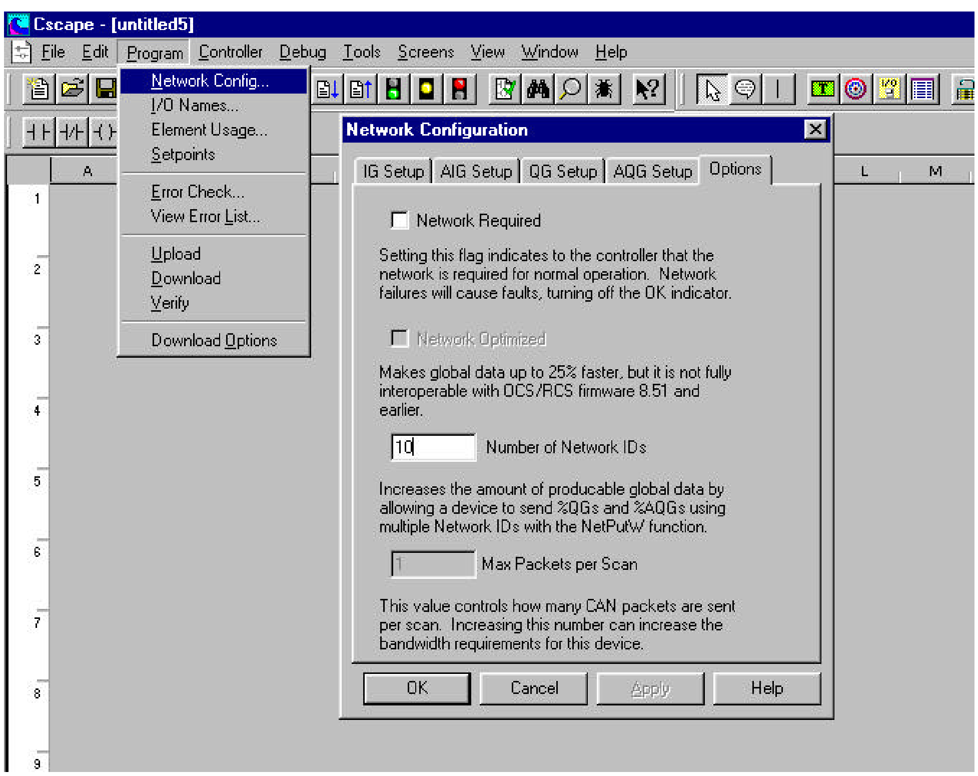
Part 1 – Changing OCS Network IDs

Through the system menu on the OCS100, configure or verify the node address is ID 1.

Through the system menu on the OCS200, configure or verify the node address is ID 21.

Part 2 – Configure the OCS100

In the OCS100 program, configure the target ID for 1 and configure the OCS100 for multiple node addresses. Click the **Program** menu, select **Network Config**, and then select the **Options** tab. Configure the OCS100 for 10 Network ID's.



Remember that the controller and the I/O will need to be configured the same as in the previous labs.

Part 3 – Write the OCS100 Program

The NET_PUT and the NET_GET operations are located in the Comm Operations Toolbar. When configuring the NET_PUT, configure it for **Change of State**. Configuring the function for Change of State saves on the network bandwidth.

Another good practice is to separate the NET_PUT's on different rungs of logic. If placed in series, the second function wouldn't be active until there was a change of state in the first function. This would cause the program to not send the second NET_PUT.

Lab 6: Advanced CsCAN Networking

In the OCS100 program, map the function keys as follows:

%K1 to drive %T1

%K2 to drive %T17

%K3 to drive %T33

%K4 to drive %T49

This will allow the function keys to turn on the different %T bits.

Now place and configure four NET_PUT ladder blocks as follows:

%T1 out as %QG1 from node 1

%T17 out as %QG1 from node 2

%T33 out as %QG1 from node 3

%T49 out as %QG1 from node 4

Place and configure four NET_GET ladder blocks as follows:

%IG1 from node 21 to %M1

%IG1 from node 22 to %M17

%IG1 from node 23 to %M33

%IG1 from node 24 to %M49

Map the %M bits as follows:

%M1 to drive %Q1

%M17 to drive %Q2

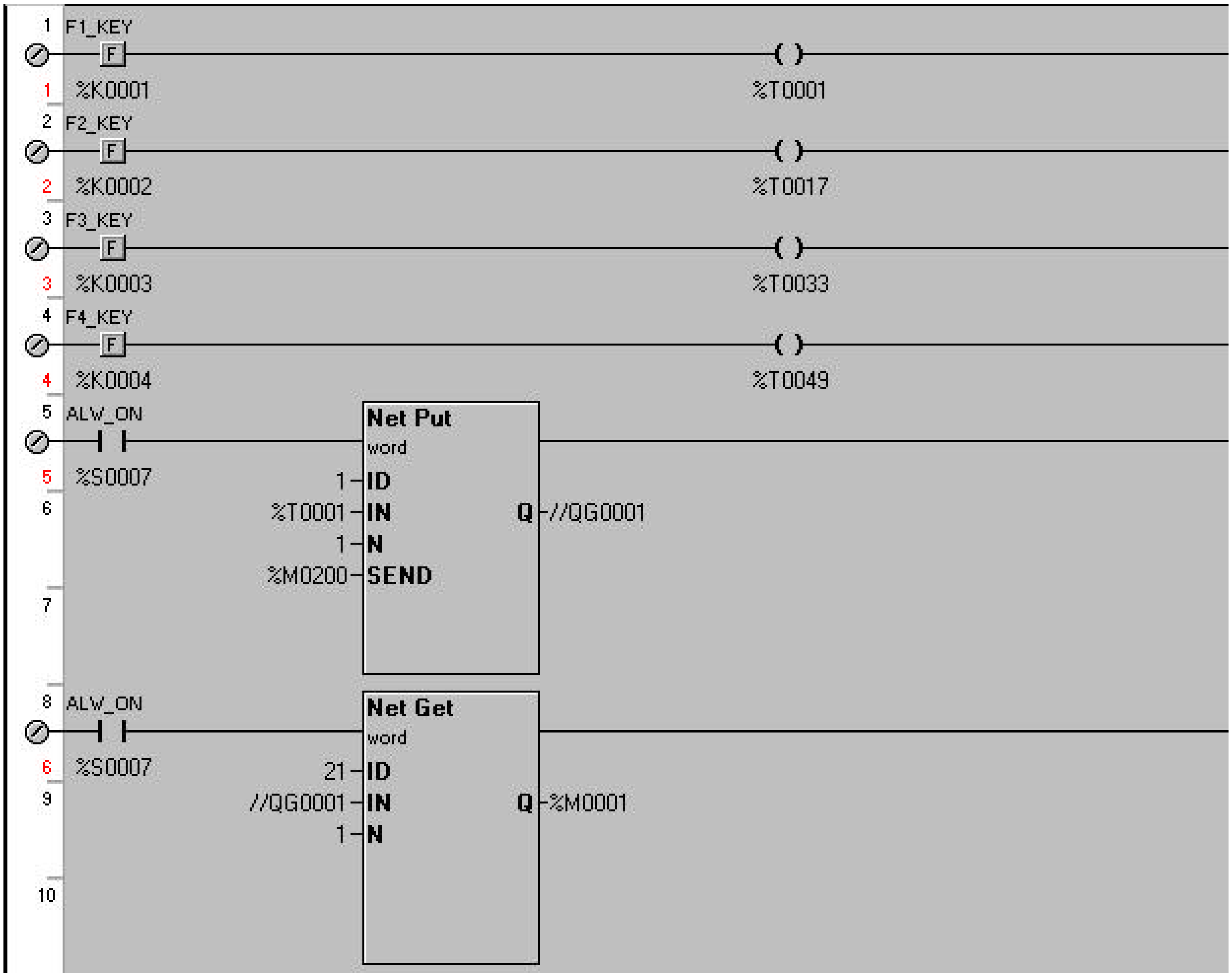
%M33 to drive %Q3

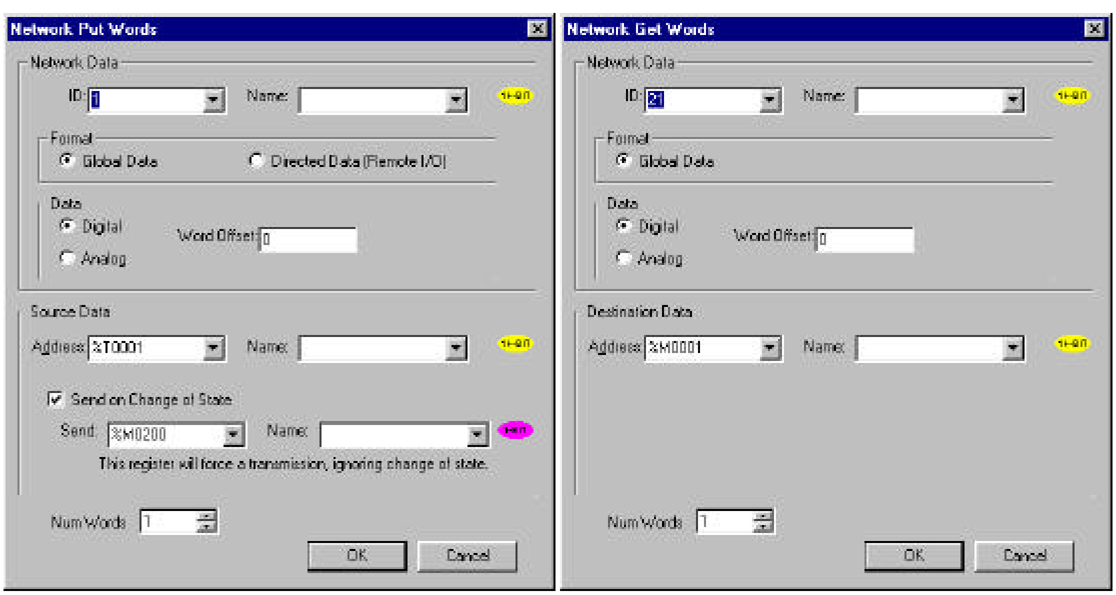
%M49 to drive %Q4

See Part 4 for pictures of what some of this should look like.

Part 4 – Program Example

The following is a portion of the code from the description on the last page.





Lab 6: Advanced CsCAN Networking

Part 5

In the OCS200 program, configure the target ID for 21 and configure the OCS200 for multiple node addresses using the same method used on the OCS100. Configure the OCS200 for 10 Network ID's.

Part 6

In the OCS200, map the function keys as follows:

%K1 to drive %T1

%K2 to drive %T17

%K3 to drive %T33

%K4 to drive %T49

This will allow the function keys to turn on the different %T bits.

Now place and configure the NET_PUT ladder blocks follows:

%T1 out as %QG1 from node 21

%T17 out as %QG1 from node 22

%T33 out as %QG1 from node 23

%T49 out as %QG1 from node 24

Place and configure the NET_GET ladder blocks as follows:

%IG1 from node 1 to %M1

%IG1 from node 2 to %M17

%IG1 from node 3 to %M33

%IG1 from node 4 to %M49

Map the %M bits as follows:

%M1 to drive %Q1

%M17 to drive %Q2

%M33 to drive %Q3

%M49 to drive %Q4

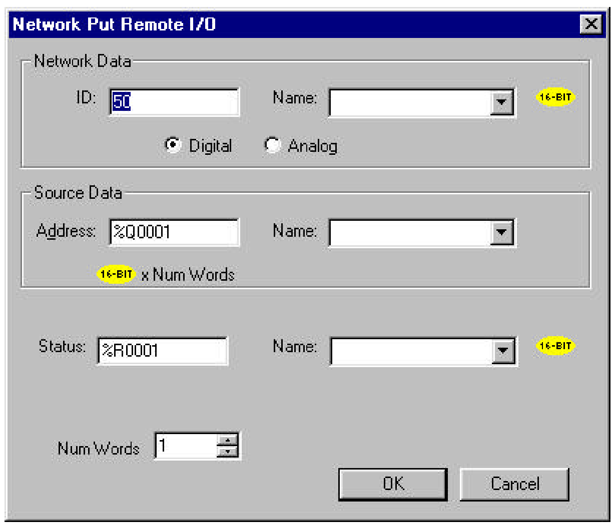
Part 7

Connect the communication cable to the OCS100 and download the program to the OCS100. Download the OCS200 to the OCS200 by using the pass through feature of the CsCAN network. Verify that both controllers are in run mode and test the program. If F1 is pressed on the OCS100, the light for output 1 should come on the OCS200.

Part 8

Add a SmartStix to the network. First set the SmartStix to a free node ID. Make sure it does not overlap one of the multiple node ID's that an OCS is using. The ID is set through the rotary switches on the front of the unit.

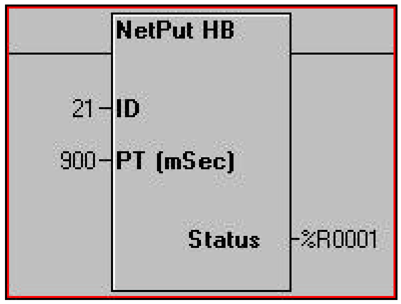
Add a line of code to the OCS100 program that will write %Q1 to the SmartStix. The SmartStix units use NET_PUT_REMOTE_I/O and NET_GET_REMOTE_I/O blocks to write and read information. These function blocks are located in the same toolbar as the other network blocks.   All OCS's on the network can access information from the SmartStix input modules but only 1 OCS can control an output SmartStix at a time. The outputs on the SmartStix will come on when %Q1 on the OCS100 comes on. Press F1 on the OCS200 and hold it. The SmartStix output should come on.

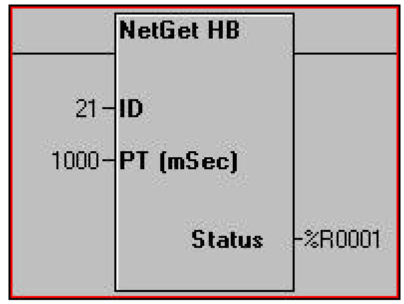


Part 9

Add logic to the OCS100 program to get the network heartbeat from the OCS200. The OCS200 program will need to be programmed to produce the heartbeat to the network.

The heartbeat blocks are in the same toolbar as the other network functions. Keep in mind the timeout of the NetGet HB on the receiving device will need to be about twice as long as the timeout of the NetPut HB on the sending device. The NetGet HB will pass power provided that it has received a heartbeat in the expected time.





Configure the program to turn on an unused output if the heartbeat expires. Then pull the CAN cable and the output should come on after the heartbeat expires.

NOTES:

LAB 7

Color Touch Lab: Screen Creation

Lab 7: Color Touch Screen Configuration

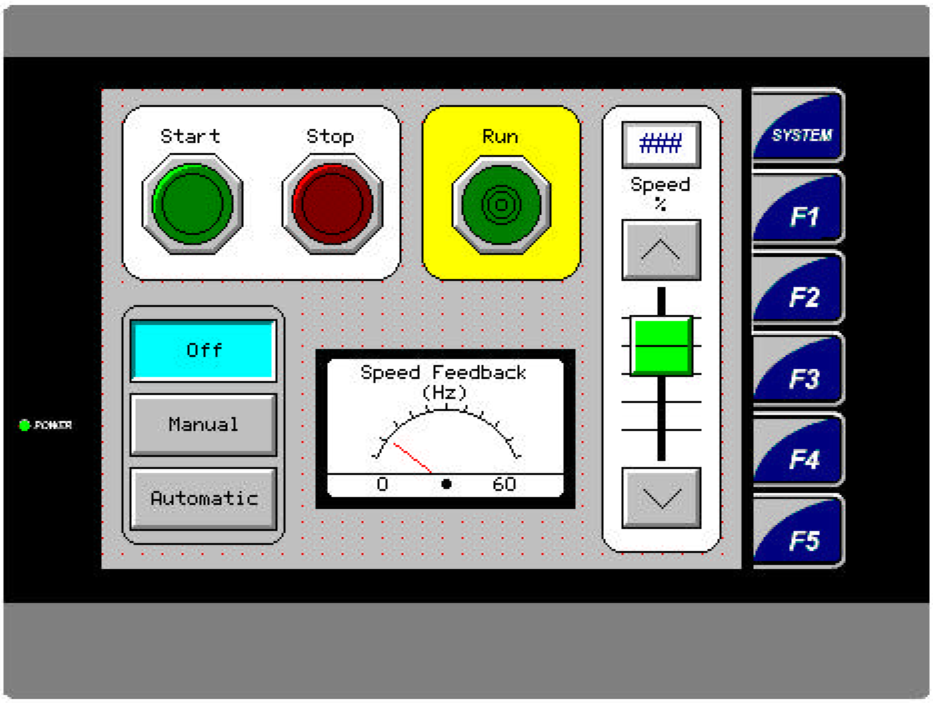
Lab 7: Color Touch Screen Configuration

Objective:

Practice building screens for the Color-Touch OCS.

Connect the serial port of your PC to a Color-Touch OCS. From Cscape, configure the controller using the “Auto Config” function.

Create an application screen similar to the following:



- Start Pushbutton: Assign to %M1
- Stop Pushbutton: Assign to %M2
- Run Indicator: Assign to %Q1
- Off-Manual-Auto Selector: Assign to %R10
- Speed Feedback (Hz) Indicator: Assign to %R5
- Speed (%) Slider: Map to %R7 (scale 0 to 100)
- Speed (%) Data Box: Assign to %R7

  - Note that the push buttons, slider bar, and the lamp indicators are placed on top of round rectangles. The round rectangles have the fill color modified from the default of none to give the effect shown above.

Create a simple “Start/Stop” circuit in Ladder with %Q1 (Run) as the Coil.

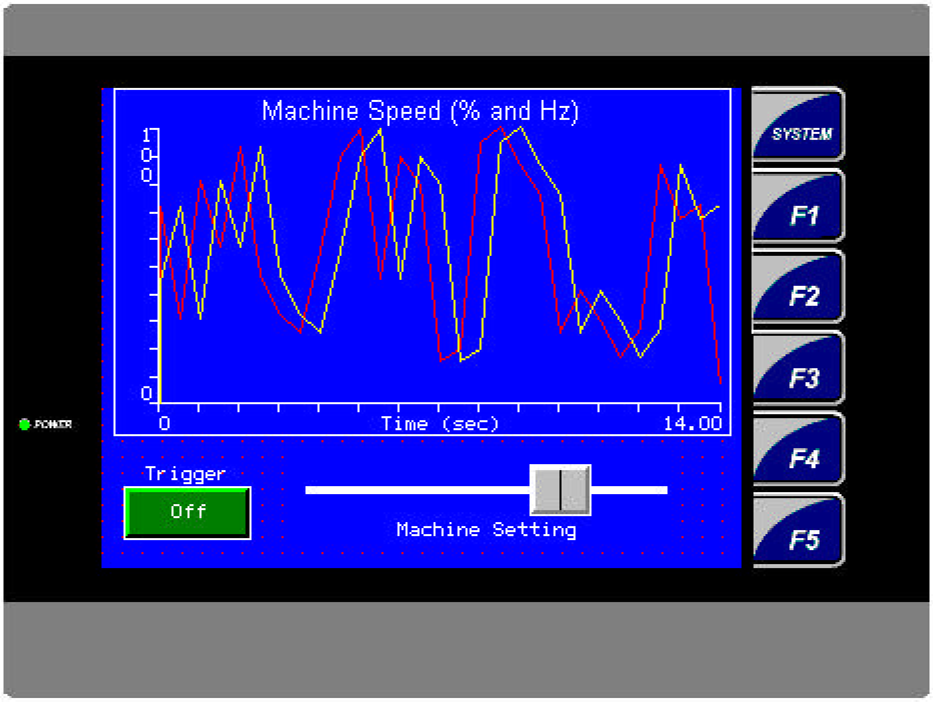
Create a simple rung in Ladder using an Integer Scale Function (look under the “Advanced Math” blocks). The scale function is always on, and should scale input %R7 (0 to 100) to output %R5 (0 to 60).

Lab 7: Color Touch Screen Configuration

Run the Ladder Logic, making sure that the logic runs as desired.

Now change your ladder so that the "Run" circuit will not be enabled unless the OCS is in "Automatic" mode.

Create a new screen, similar to the following:

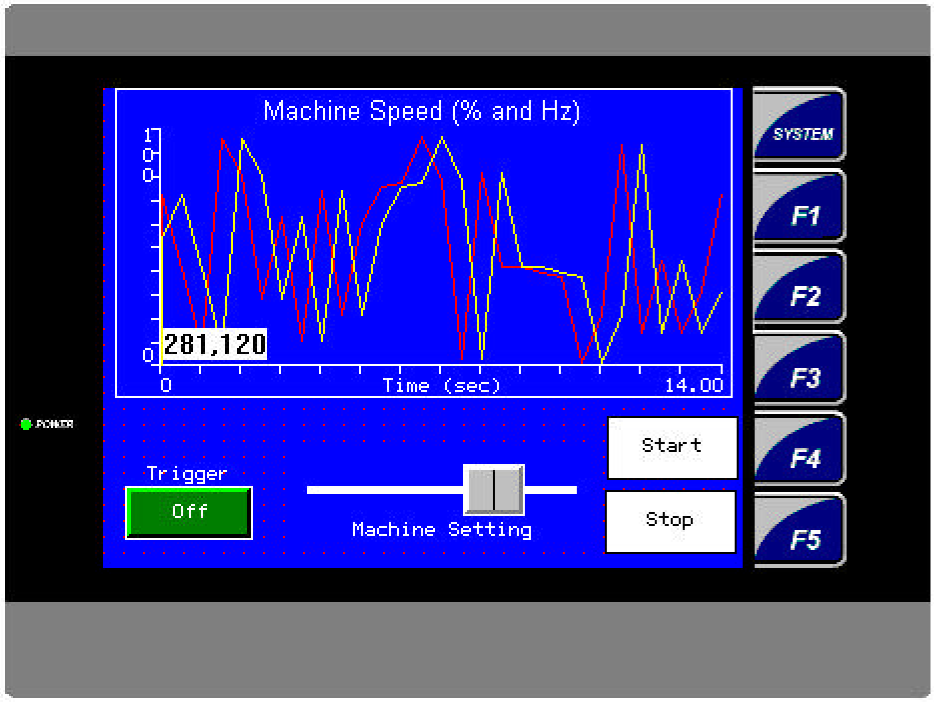


- Trend Type: 50mS Continuous Scope
- Trend Trigger: Assign to %T1
- Trend Pens: Pen 1 - %R7 scale 0-100. Pen 2 - %R5 scale 0-60.
- Pushbutton ("Trigger"): Assign to %T1
- Scale: Assign to %R7 scaled 0-100.

Add logic to your ladder that uses F1 to call up the control panel screen, and F2 to display the trend screen. This should work regardless of which screen is currently being displayed.

Download and test the program.

Extra Credit: Change your trend screen, similar to the following:



This screen adds "Start" and "Stop" capabilities to this screen. The "Start" and "Stop" legends on the above screen are only that – legends. The user must press F4 to activate the Start Functionality, and F5 to activate the Stop functionality. Use the same Start (%M1) and Stop (%M2) bits previously assigned.

More Extra Credit: Make the "Start" legend visible only when the run circuit is off. Make the "Stop" legend visible only when the run circuit is on.

Lab 7: Color Touch Screen Configuration

NOTES:

LAB 8

Graphic Alarms

Lab 8: Graphic Alarms

Lab 8: Graphic Alarms

Objective:

Understand the powerful Alarm capabilities of the Color-Touch OCS.

Procedure:

Build off of your program from Lab 7.

From the Graphics Editor, click on the **Config** menu and select **Alarm**.

Configure Alarms as following:

- Alarm Trigger: %M1601
- Max Number of Alarms: 32

Name the first 4 alarms as follows by double-clicking them in the list:

- Alarm 1, Group 1 Low-speed Warning
- Alarm 2, Group 1 High-speed Warning
- Alarm 3, Group 1 Motor Overload Trip
- Alarm 4, Group 1 E-stop Trip

Exit the Alarm configuration and the graphics editor.

Add to your logic to trigger Alarm 1 (%M1601) whenever %R7 is less than 15 (and the machine is running)

Add to your logic to trigger Alarm 2 (%M1602) whenever %R7 is greater than 90.

Add to your logic to trigger Alarm 3 (%M1603) whenever %I1 is off. Add a normally-closed %I1 to your run circuit, so that if %I1 is not on, the circuit will not run.

Add to your logic to trigger Alarm 4 (%M1604) whenever %I2 is off. Add a normally closed %I2 to your run circuit, so that if %I2 is not on, the circuit will not run.

Back in the graphics editor, add an Alarm Indicator Button to the Control Panel Screen, as well as to the Trend Screen. An example is shown in Figure 1. The Alarm Indicators should display an Alarm Summary when pressed, for all Alarm groups.

Create a new screen that is called whenever F3 is pressed. This screen should contain an Alarm Summary Object, and an Alarm History Object. An example is also shown in Figure 2.

Download and execute the application. Practice triggering alarms, acknowledging them and clearing them. Note the differences between what is displayed in the "Summary" log, and what is displayed in the "History" log.

Use the "Alarm Indicator" button on the first two screens as a means of viewing the Alarm Summary. Note the conditions that will cause the Alarm Indicator buttons to change color.

Lab 8: Graphic Alarms

Extra Credit: Create a screen showing a simple graphical diagram of a house. Place an alarm indicator button on the Basement (Group 1), First Floor (Group 2), Second Floor (Group 3) and Garage (Group 4). Add new alarms to the Alarm Configuration, a couple each for groups 2, 3, and 4. Trigger those new alarms with unused switches on the I/O Simulator (%I3-%I8). Note how groups are a great way to segment alarms into manageable groups that can be monitored in separate alarm summary and history logs, as well as larger groups. (See Figure 3).

Figure 1

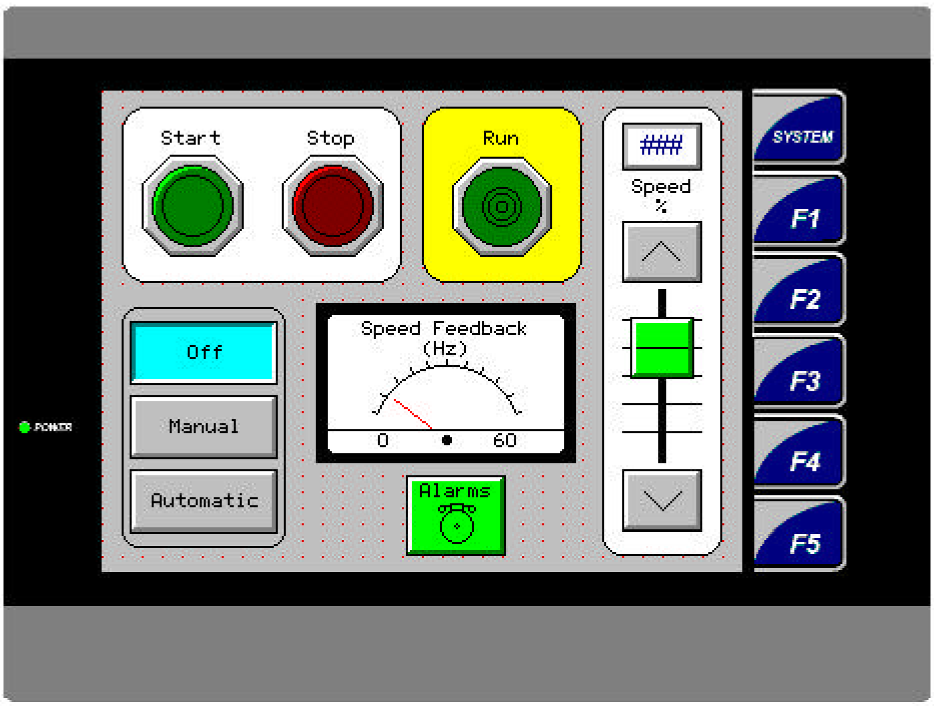


Figure 2

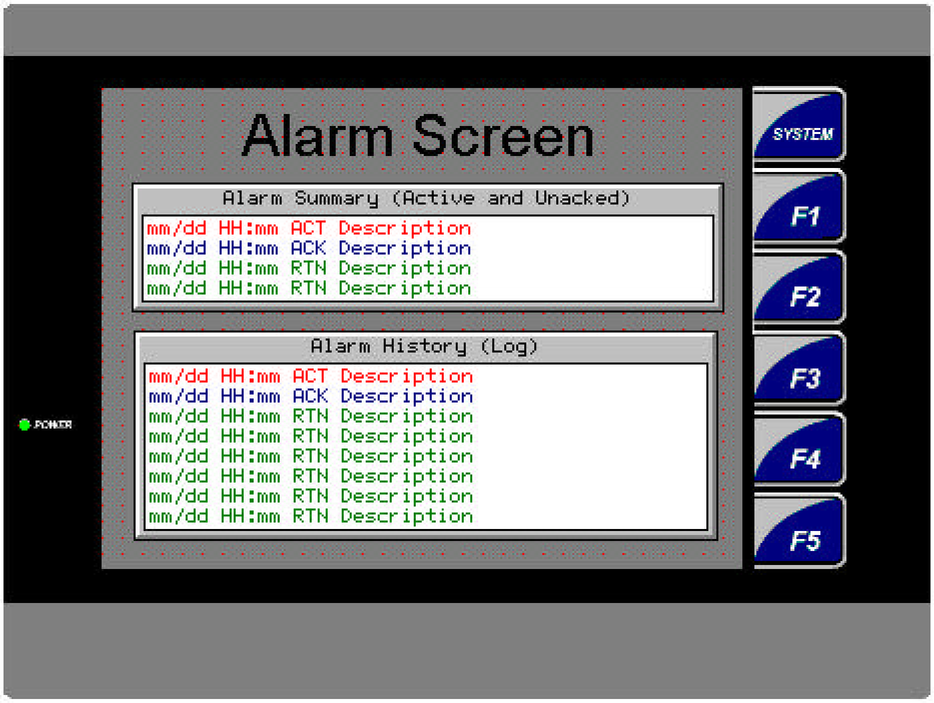
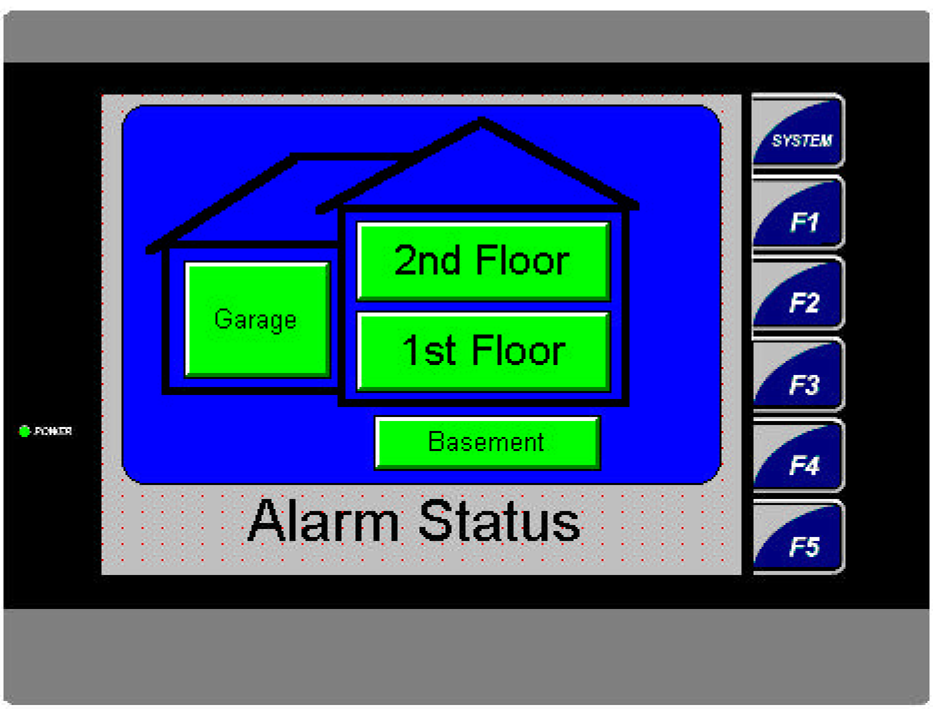


Figure 3



NOTES:

LAB 9

Color-Touch Advanced Graphics Options

Lab 9: Advanced Graphic Options

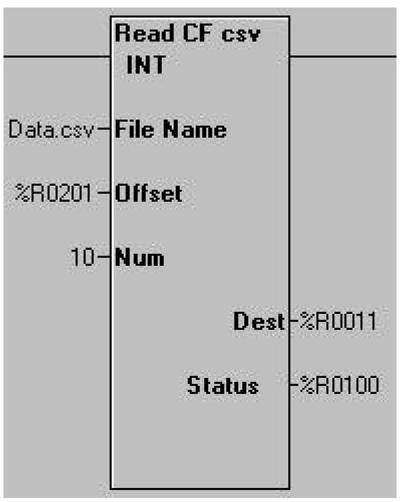
Lab 9: Advanced Graphic Options

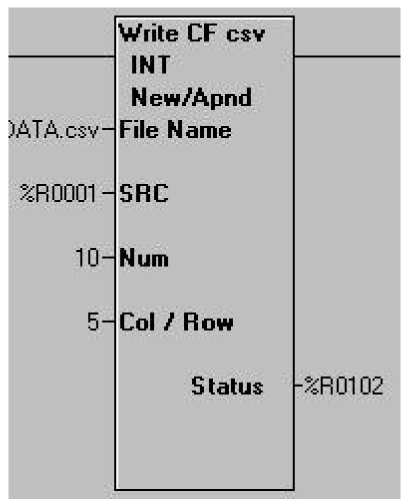
Objective:

Understand the functionality of the CompactFlash (CF) functions, the dynamic changes to screen object attributes, the symbols library, and the video-input feeds into the SVGA units.

CompactFlash Data Files

All of the SVGA OCS units, OCS451/551/651, support CompactFlash. This gives the program the ability to store information to the CF card and also read information back into the program. Since the information is stored in a Comma Separated Value (CSV) format, the CF card can be removed from the unit and then read into a spreadsheet. Conversely, a CSV file could be created from a PC, stored to the flash, and then read into the OCS. CF ladder functions are found in the Special Operations toolbar.





1. Open Cscape and create a ladder program that will write 10 registers of information, starting at %R1, when triggered by %T1. Use the Write CF function configured for Create/Append to perform this action and call the file Data.csv.
2. Create a line of code that will read the information from the Data.csv file and store the information in %R11 when %T2 is triggered. The offset should be configured for %R201. If a constant is used as the offset, the program will always be reading the value in that offset. Place a positive transition coil after the Read block to trigger an add for the pointer of the offset
3. Create a line with the coil in number 2 triggering an add of 10 to %R201 and then storing the value back in %R201.
4. Create a line of code that uses the Delete CF block and use the filename of Data.csv. Also include a move command to reset the pointer for the CF read to zero.

5. Now configure a screen to have the following
   - Button to actuate %T1
   - Button to actuate %T2
   - Button to actuate %T3
   - Register field for %R1 that is editable
   - Register field for %R2 that is read only
   - Place the CF manager on the screen, double-click it, and select the option to delete files.
6. Download the program to the OCS.
7. Change the value in %R1.
8. Press the %T1 button. The information in %R1 is now stored to the CF.
9. Press the %T2 button. The information should now appear in the %R11 data field on the screen.
10. Load many different values in the CF by changing the write value and then pressing the write button.
11. Now read all of the values in the read block.

The next page contains a ladder example of the solution.

CompactFlash File Naming

The OCS CF function blocks support the flash with a DOS/Windows standard FAT16 file system. All names must be limited to the "eight dot three" (8.3) format where the filename contains a maximum of eight characters, a period, and an extension with a maximum of three characters. The entire filename including any path must be less than or equal to 147 characters in length.

Lab 9: Advanced Graphic Options

When creating filenames and directories, it is sometimes desirable to include parts of the current date or time. There are six special symbols that can be entered into a filename that are replaced by the OCS with current time and date information.

Symbol	Description	Example
$Y	Substitutes the current 2 digit year	2004 = 04
$M	Substitutes the current month with a 2 digit code	March = 03
$D	Substitutes the current day	22nd = 22
$h	Substitutes the current hour in 24 hour format	4 PM = 16
$m	Substitutes the current minute	
$s	Substitutes the current second	
$p	Substitutes the currently displayed 4-digit screen number (1-1023, Intended mainly for screen capture)	53 = 0053

Note that all the symbols start with the dollar sign ($) character. Date symbols are in upper case; time symbols are in lower case.

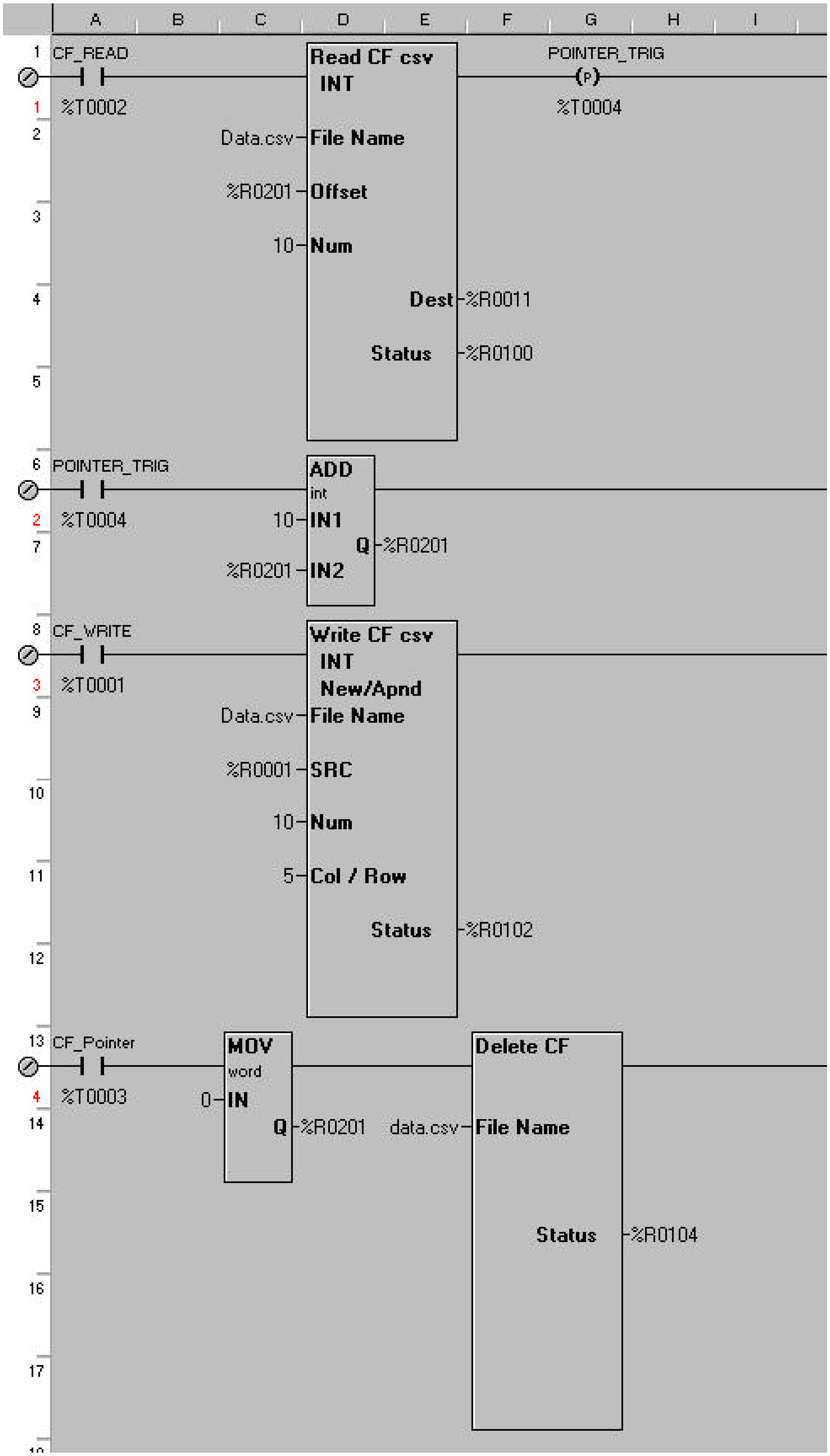
The following are examples of the substituted time/date filenames:

If the current date and time = March 1, 2004 3:45:34 PM

Data$M$D.csv = Data0301.csv

Year$Y\Month$M\aa$D_$h.csv = Year04\Month03\aa01_15.csv

Month_$M\Day_$D\$h_$m_$s.csv = Month_03\Day_01\15_45_34.csv


A
B
C
D
E
F
G
H
I
CF_READ
%T0002
Read CF csv
INT
POINTER_TRIG
%T0004
Data.csv
File Name
%R0201
Offset
10
Num
Dest
%R0011
Status
%R0100
POINTER_TRIG
%T0004
ADD
int
10
IN1
Q
%R0201
%R0201
IN2
CF_WRITE
%T0001
Write CF csv
INT
New/Apnd
Data.csv
File Name
%R0001
SRC
10
Num
5
Col / Row
Status
%R0102
CF_Pointer
%T0003
MOV
word
0
IN
Q
%R0201
Delete CF
data.csv
File Name
Status
%R0104

Lab 9: Advanced Graphic Options

CompactFlash File Counters

Another tool available for use in naming CompactFlash files is the Filename Counter. There are four available Filename Counters that can be separately configured. Configuration is done through the Graphics Editor by clicking **Config** and selecting **Filename Counters.**

Each Filename Counter requires a 32-bit register regardless of the maximum values that the counter will see. A maximum value is specified for each counter and also the options to auto-increment and wrap the counter value.

The auto-increment function causes the counter to be automatically incremented by a value of 1 each time the Filename Counter is accessed.

The wrap counter function causes the counter to start over at 0 when the maximum value is exceeded. If the wrap counter function is not activated and the counter reaches the maximum value, the counter will no longer automatically increment and the value will remain at the maximum setting.

Accessing the counters is done similarly to the date and time symbols. The format to access any of them is as follows:

$[counter number]u[# of digits, 1-8]

For example, using counter 1 for a screen capture, if the counter has a Max value of 59, the current value is 35 and the Auto Increment is checked:

$1u4 = 0035

The next time the screen is captured, the value will be 0036, then 0037, etc. This can be implemented into the filename as follows:

Given:

Current date and time = March 1, 2004 3:45:34 PM

Counter 3 Auto Incrementing, Max of 59, currently at 58, Wrap turned ON

Captures\Chan3\$M-$D-$Y\$h$m-$3u2.bmp

= Captures\Chan3\03-01-04\1545-58.bmp

Next screen capture (assuming same time and date)

= Captures\Chan3\03-01-04\1545-59.bmp

Next screen capture (assuming same time and date)

= Captures\Chan3\03-01-04\1545-00.bmp

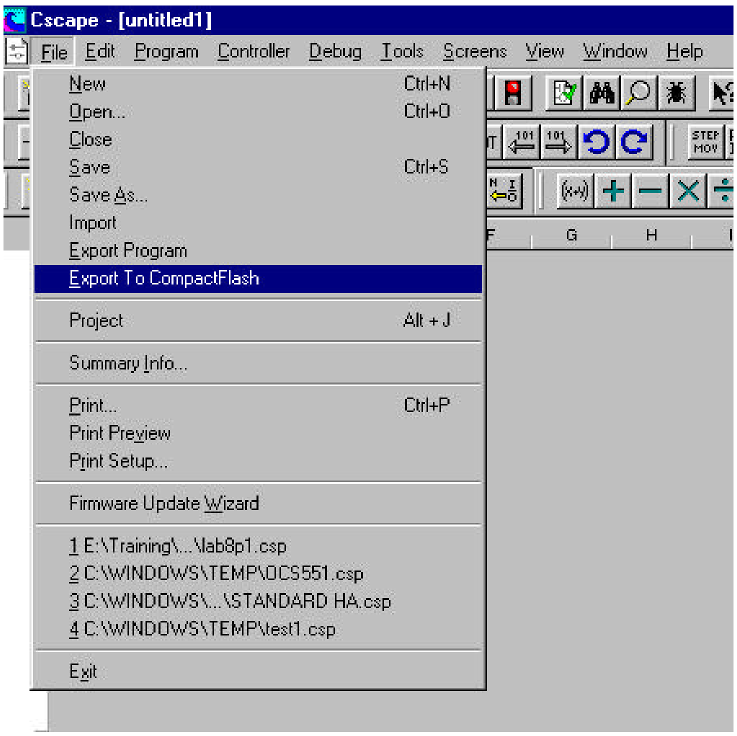
Note: You MUST specify the filename extension in all cases. It is never automatically added.

CF Program Downloads

One feature of the CompactFlash functionality is the ability to load an OCS with a program from a CF card instead of through Cscape.

The programmer saves the Cscape program as a special file type with a .pgm extension by clicking the **File** menu and selecting **Export to CompactFlash**. It can be exported directly to a CompactFlash writer connected to the computer or to anywhere else on the computer to be transferred to CompactFlash later. The user will then insert the CF card into the OCS and, through the System Menu, select CompactFlash to find the correct file to load.

The screen shot below illustrates where in Cscape the write to CompactFlash is done.



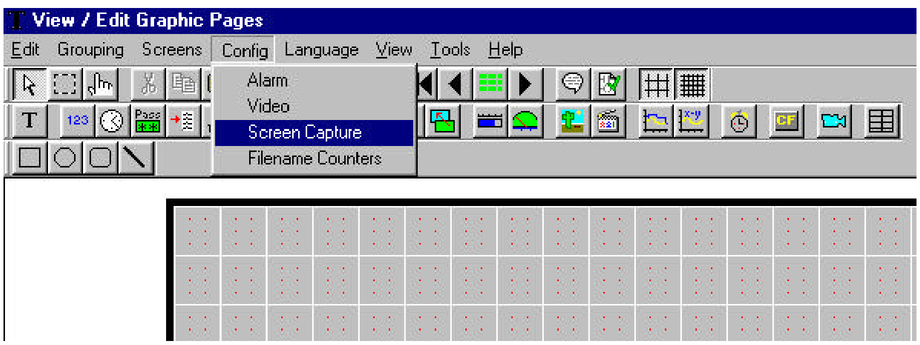
CF Screen Captures

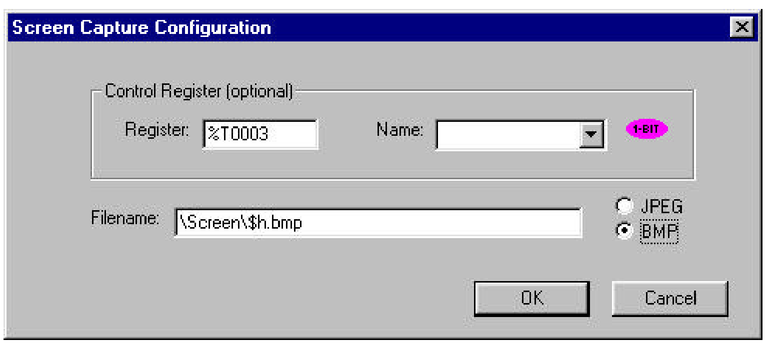
The SVGA ColorTouch OCS units have the ability to capture a displayed screen to CompactFlash as a JPEG or Bitmap file. These images can then be recalled on the unit through the CF manager or viewed on a computer with a graphics viewer.

Lab 9: Advanced Graphic Options

Configuring the Screen Capture function is done through the Graphics Editor by clicking the **Config** menu and selecting **Screen Capture**. A 1-bit register must be configured as a trigger and a filename for the captured graphic file must be specified. The filename date functions and filename counters can be used for this. The OCS provides feedback that the screen capture is done by resetting the 1-bit register to an OFF state.

1. Add a button to the screen that will perform a screen capture. Set the button for %T3 and make it a toggled button.
2. Configure the Screen Capture to trigger off of %T3 and specify a filename.
3. Add a CF Manager to the screen.
4. Download to the OCS
5. Press the new button
6. Press the CF Manager and then find the captured graphic.
7. Open the file that was just saved to the CF. Note the red edge around the displayed graphic that indicates it is not a live, updating screen.





CF Video Input Captures

With the optional VIM400 Video Input Module installed on an SVGA ColorTouch OCS, there is now the ability to not only view up to 4 video feeds but also to capture a still from any of them and save it to CompactFlash as either a JPEG or Bitmap file.

Configuring the Video Capture function is done through the Graphics Editor by clicking the **Config** menu and selecting **Video**. A single, 16-bit register is specified that is split into 4 bits for each of the four channels. There is a table shown on the configuration screen to help figure out this mapping. The 2nd bit of each 4-bit set is the Save bit. A filename must be specified for each channel if the Save function is to be used. This filename adheres to all the rules stated in the above sections.

After configuring the Video and downloading the program, triggering the Save bit for any video channel will capture a still of that input and save it to CompactFlash as the filename specified and in the format specified. The Save bit provides feedback in the same way as the Screen Capture function in that it will be reset when the OCS is done saving the file.

Dynamic Screen Attributes

Objects placed on screens have the ability to be changed dynamically with the ladder program.

1. Configure a screen for a Text Table.
2. Configure the Text Table to edit %R300 – Remember to check the editable box.
3. Configure the Text Table for the following:

   0 = Green

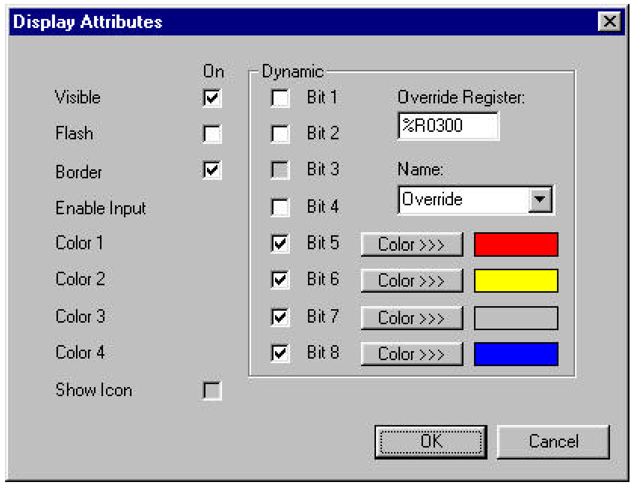
   16 = Red

   32 = Yellow

   64 = Gray

   128 = Blue
4. Configure the Legend to reflect FILL COLOR

5. Configure the Attributes to the following:



6. Configure the background screen for black, the line and data color to green.
7. Place an object on the screen, such as a box.
8. Configure the attributes to the same as the attributes listed above.
9. Configure the fill color of the box to green.
10. Download the program
11. You should be able to use the FILL COLOR box to change the color of the text in that box and also the color of the other box. Note that the legend text of the Text Table doesn't change color.

Symbol Factory

With every purchased copy of Cscape, the software is sent with the symbol factory. The simple factory pictures can be used as static bitmaps on the screen or in an animated bitmap.

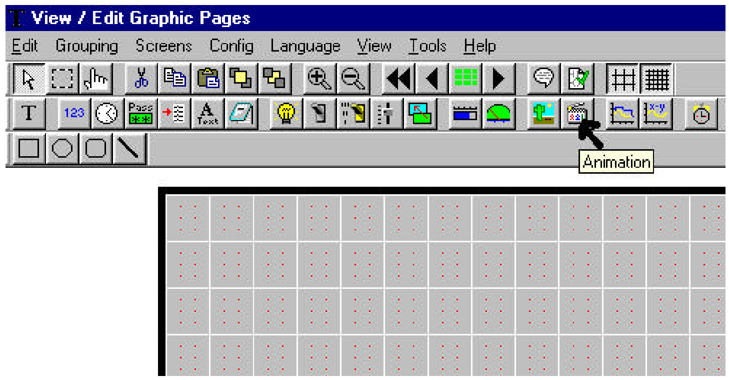
1. Delete the objects off of the current screen.
2. Place another text table box on the screen.
3. Configure the address to %R100
4. Configure the text table to be editable.
5. Set the text table for 5 digits.
6. Configure a new text table for the following.

   0 = LEFT

   1 = UP

   2 = RIGHT
7. Change the legend to Switch

8. Place an Animated Bitmap on the screen



9. The Animated Bitmap will need to be adjusted for size.
10. Double click on the black box.
11. Set the address to %R100.
12. Click on Symbol Frame and pick Selector Switch 1 left
13. Increment the frame to 1 and then select Selector Switch 1 up.
14. Increment the frame to 2 and then select Selector Switch 1 right.
15. Click ok.
16. The Selector should show up on the screen.
17. Close the editor and download the program to the unit.
18. The text table can be manipulated to change the selector to the different positions.
19. To pick additional symbols, click on **Tools**, **Start Symbol Picker**
20. Look through the symbols, there are many available to choose from

NOTES:

CHEAT SHEET

Data Types

BOOL - Boolean; A single bit. It can contain only the values '0' or '1', a.k.a ‘FALSE’ or ‘TRUE’

BYTE - Byte; A string of 8 consecutive bits. Byte format is used more where the value of the data is not as important as the bit patterns (shifts and rotates).

WORD – Word; A string of 16 consecutive bits. Word format is used more where the value of the data is not as important as the bit patterns (shifts and rotates).

DWORD - Double Word; A string of 32 consecutive bits. DWORD format is used where the value of the data is not as important as the bit patterns (shifts and rotates).

INT – Integer; A 16-bit signed value. Integers are used where the value of the data is expected to be in the range of -32,768 to +32,767

SINT - Short Integer; An 8-bit signed value. Short Integers are used where the value of the data is expected to be in the range of -128 to +127.

DINT - Double Integer; A 32-bit signed value. Double Integers are used where the value of the data is expected to be in the range of -2,147,483,648 to +2,147,483,647.

UINT - Unsigned Integer; A 16-bit unsigned value. Unsigned Integers are used where the value of the data is expected to be in the range of -0 (zero) to 65,535.

USINT - Unsigned Short Integer; An 8-bit unsigned value. Unsigned Short Integers are used where the value of the data is expected to be in the range of 0 (zero) to 255

UDINT - Unsigned Double Integer; A 32-bit unsigned value. Unsigned Double Integers are used where the value of the data is expected to be in the range of 0 (zero) to 4,294,967,296.

REAL - Floating Point; A 32-bit value. Values are stored and operated on in IEEE single precision (six digit) format. Values range from -3.40282E+38 to +3.40282E+38.

STRING – String; A variable-length succession of characters. Each character is represented by one byte.

Register Types

Type	Description and example of what might use the type	Format	Retentive	#Available
%I	Discrete Inputs from the field; prox sensors, panel buttons, etc	BOOL	YES	2048
%Q	Discrete Outputs to the field; relays, indicator lamps, etc.	BOOL	NO	2048
%AI	Analog Inputs from the field; Thermocouples, 4-20mA inputs	WORD	YES	512
%AQ	Analog Outputs to the field; 0-10VDC or 4-20mA outputs	WORD	NO	512
%IG	Global Discrete Inputs from the CAN; in from other OCS	BOOL	YES	64 per node
%QG	Global Discrete Outputs to the CAN; out to other OCS	BOOL	NO	64 per node
%AIG	Global Analog Inputs from the CAN; in from other OCS	WORD	YES	32 per node
%AQG	Global Analog Outputs to the CAN; out to other OCS	WORD	NO	32 per node
%T	Internal Temporary bits, use for contacts and coils	BOOL	NO	2048
%M	Internal Temporary bits, use for contacts and coils	BOOL	YES	2048
%R	Internal Registers, use for Timers and Counters and other data	WORD	YES	2048-9999
%K	Keypad bits, reflect Function Key status	BOOL	NO	5-12
%D	Display bits, control screens or indicate screen on/off	BOOL	NO	200-1023
%S	Internal System Bits (See System Registers)	BOOL	---	---
%SR	Internal System Registers (See System Registers)	WORD	---	---

Cheat Sheet

System Bits

Point	Name	Function
%S01	FST_SCN	Indicates First Scan
%S02	NET_OK	Network is OK
%S03	T_10MS	10mS pulse
%S04	T_100MS	100mS pulse
%S05	T_1SEC	1 second pulse
%S06	IO_OK	I/O is OK

Point	Name	Function
%S07	ALW_ON	Always ON
%S08	ALW_OFF	Always OFF
%S09	PAUSING_SCN	Pause 'n Load soon
%S10	RESUMED_SCN	Pause 'n load done
%S11	FORCE	I/O being forced
%S12	FORCE_EN	Forcing is enabled

System Registers - For Details on the functionality of the different SR registers, consult the help file.

SR #	Name	Min	Max
1	User Screen Number	0	200*
2	Alarm Screen Number	0	200*
3	System Screen Number	0	10*
4	Self Test Result		
5	Controller Mode (RUN..)	0	2
6	Scan Rate Avg		
7	*Reserved*		
8	*Reserved*		
9	Edit Buffer Low		
10	Edit Buffer High		
11	Ladder Size Low		
12	Ladder Size High		
13	User Text Size Low		
14	User Text Size High		
15	System Text Size Low		
16	System Text Size High		
17	I/O Config Size Low		
18	I/O Config Size High		
19	Net Config Size Low		
20	Net Config Size High		
21	Security Data Size Low		
22	Security Data Size High		
23	Ladder CRC		
24	User Text CRC		
25	System Text CRC		
26	I/O Config CRC		
27	Net Config CRC		
28	Security Data CRC		
29	Network ID Low	1	253
30	Network Baud Rate	0	3
31	Network Required	0	1
32	LCD Contrast	1	255
33	Key Toggle Mode	0	1
34	Serial Protocol		
35	Serial Number Low		
36	Serial Number High		
37	Model Number		
38	Engine Version		

SR #	Name	Min	Max
39	BIOS Version		
40	FPGA Version		
41	LCD Columns		
42	LCD Rows		
43	Keypad Type		
44	RTC Seconds	0	59
45	RTC Minutes	0	59
46	RTC Hours	0	23
47	RTC Day of Month	1	31
48	RTC Month	1	12
49	RTC Year	1996	2095
50	RTC Day of Week	1	7
51	Network Error Count		
52-55	*Reserved*		
56	Last Key		
57	LCD Backlight		
58	User Leds		
59-60	*Reserved*		
61	Num Ids		
62-174	*Reserved*		
175	CF Status		
176	CF Free Low		
177	CF Free High		
178	CF Total Low		
179	CF Total High		
180	Reserved		
181	Alarms Unacknowledged		
182	Alarms Active		
183	System Beep	0	1
184	User Beep	0	1
185	Screen Saver	0	1
186	Screen Saver Time	5	1200
187	Network Usage (Avg)	0	1000
188	Network Usage (Min)	0	1000
189	Network Usage (Max)	0	1000
190	Network TX Use (Avg)	0	1000
191	Network TX Use (Min)	0	1000
192	Network TX Use (Max)	0	1000

*Maximum User, Alarm and System screens vary from model to model

Max = 200 for MiniOCS, OCS1x0, OCS2x0… Max = 1023 for OCS250, OCS3xx, OCS4/5/651

Notes

HORNER
Advanced Products Group
640 North Sherman Drive. Indianapolis, IN 46201
Phone - (317) 916-4274 Fax - (317) 916 4287

Phil Horner
President
Ext. 410
phil.horner@heapg.com

Technical Support
Ext. 3
techsppt@heapg.com

Customer Service
Ext. 1
APGCustomerService@heapg.com

Sales and Marketing
Ext. 2
apgsales@heapg.com

Ken Jannotta, Sr.
VP of Sales and Marketing
Office: 434-973-9245
Cell: 434-825-7550
kensr.jannotta@heapg.com

Bill Giebel
Business Development Manager
Ext. 498
Cell: 317-407-7937
bill.giebel@heapg.com

Roy Lowery
Business Development Manager
Ext. 436
Cell: 317-407-9506
roy.lowery@heapg.com

Tom Filipek
Business Development Manager
Office: 651-426-2282
Cell: 612-840-6653
tom.filipek@heapg.com

Chuck Ridgeway
Product Manager
Ext. 415
chuck.ridgeway@heapg.com

Eric Broyer
Technical Support Manager
Ext. 442
eric.broyer@heapg.com

Nate Beachey
System Design Engineer
Ext. 466
nathan.beachey@heapg.com